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THE

INDIAN FORESTER.

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Cardamoms in Coorg.

The Cardamom cultivated in Coorg is the *Elettaria Cardamomum*, and though the trade, so far as native cured fruit is concerned, is steadily falling, still the cardamom is an important article to the people and is certainly the cause of much thought and anxiety to the Administrators of this little Province.

I will not give any botanical description of the cardamom in this article nor will I refer to the other kinds which are not utilised, but endeavour to give an idea of the habitat of the plant and the methods of curing it followed by the people, with a few remarks on the state of the cardamom trade.

The cardamom grows best on the Western and Northern slopes of the ghats at an elevation of from 3,000 to 5,000 feet above the sea. Here the full burst of the monsoon strikes the steep sides of the hills and the rainfall reaches as much as 300 inches in some parts. It grows spontaneously, but is one of those peculiar plants, the seed of which lies dormant till induced to germinate by the occurrence of certain conditions. One of these is the admission of light. Cardamoms will only be found in the dense evergreen forest, and the ordinary method of inducing them to appear is to open a small space in the forest by felling one or two very large trees. Not only does this admit the light but the fall of the trees shakes the ground and breaks the surface. So thoroughly is the necessity for the shaking of the ground believed in, that when a plot is selected, all undergrowth, small trees, &c. which might interfere with or break the fall of the giant selected for destruction, are cleared away so that the tree may descend with all its weight and momentum : and to intensify the effect, the tree is always felled so as to face down hill. As these plots are almost invariably situated on the steepest hills, the effect of the fall of one of the enormous trees so common in the Ghat Forests must be very grand.

A Cardamom Estate is called a " malé " and the ordinary method of cultivating a " malé " among the Coorgs, is to open out

a certain number of these plots within the limits of the same. The plots are necessarily small, for only a limited amount of light is required and a plot too large, in addition to admitting too much light, would also allow of evaporation from the soil to an injurious extent. In the leases given for "malés" the maximum size of each plot is fixed at one-sixth of an acre and at least thirty feet of forest must be left between any two plots. As a rule not more than two trees are felled and oftener only one. The felling generally takes place in February or March in the year and by the rains the young plants shoot up. They require weeding at least once before they begin to yield, which takes place in the third year. The plant continues to bear for seven or eight years, the fourth and fifth and sixth of its age being its best. When it begins to cease bearing, either a new plot is selected or another tree is felled which seems to give a fresh start to the plant.

The position of these "males" is generally so remote and inaccessible that the picking of the crop is undoubtedly no easy task. In fact, the Coorgs lose a large proportion of the crop, for the fruit begins to ripen as early as July, while they never attempt to pick before well into September. The tremendous rainfall not only, in itself, deters them from penetrating the hills, but renders the numerous streams and torrents impassable. Indeed, on the exposed slopes of the Ghats, life would scarcely be liveable in the height of the monsoon. As it is, the leeches in these forests throughout the autumn and cold weather months must be seen to be appreciated, and in addition to these drawbacks, the steepness of the hills is such that walking is difficult. When climbing about these "males" one can quite comprehend the feelings of a fly walking up the side of a house.

The cardamoms are picked and sun-dried. If the malé is far from the village, the drying takes place on the spot, otherwise the capsules are taken home. Four days sunning is sufficient, care being taken that they do not get wet and that they are not over exposed, as this latter would cause the capsules to burst. But beyond this open air drying, no further curing takes place. The fruit stalks are rubbed or picked off. In this part of the process, it is wonderful the number of capsules a practised hand will clean in any given time. The capsules are then assorted according to size and colour and stored away till disposed of. But a better system of both cultivation and curing has been introduced into Coorg by an English planter in the ghats. I am much indebted to Mr. Finlayson for his having put at my disposal the necessary information concerning his treatment of cardamoms. In the first place, the cardamom plant is raised from seed in a nursery and the plants are put out in a compact plantation, instead of being allowed to grow spontaneously in scattered clearings. The first step is to prepare the area which is to be made into a cardamom plantation. This is done by thinning the shade. The amount of thinning can only be determined on the spot and is guided by experience. The

aspect chosen is generally North or North West and the most favourable places are the moist hollows and ravines. The undergrowth is cleared, and planting is done in June and July, from nursery plants raised from seed, supplemented by bulbs from old stools, Mr. Finlayson prefers the latter as growing better. The plants are put out at 7 feet by 7 feet, not deep in the soil. The plants are put into shallow pits which have been filled with surface mould, the soil is pressed round the half exposed bulb and the plant tied to a stake.

These Cardamoms yield a small crop the third year after being put out and they do not come into full bearing until the fifth year, thus there is no advantage in time in this method of cultivation. The yield then is about half a seer to each plant. Thus an acre would give about 475 seers, or say, 950 pounds ; under half a ton. The picking lasts from July to January, September and December being the busiest months. The first crop always yields the largest fruit.

Before preceeding to give Mr. Finlayson's method of curing, I will venture on a comparison of the advantages resulting from the two systems of cultivation, the native one by means of isolated and scattered openings in the forest, and the English one of a regular plantation. As to the former, the only advantage that can be claimed, and I am not certain that the claim should be allowed—is that it does less harm to the forest which, as the Ghaut Forests should be preserved for climatic reasons, is a very important point. Mr. Dickinson, whose knowledge of the conditions of cardamom cultivation owing to his personal inspection of the malés and ghaut forests is unique, is in favour of the native method on the ground of less damage being done to the forest. He argues that the partial clearing of the high forest over a comparatively large area accompanied by the removal of the undergrowth, tends to set up scouring and that the soil will be all washed away. But the drawback to the native system is the difficulty of supervising the work and of enforcing the rules as to the size of the plots and the width of the belt of forest to be left between each plot, and though it is in the interest of the malé holder not to open the forest to too great an extent, it is a question whether, with the low prices ruling in the cardamom market, the urgent necessity of raising a large crop will not, and does not, tempt malé holders into over-felling, leaving the future to look after itself. Where a forest has been over-felled under the native system, the damage is practically irreparable. It is with very great diffidence that I differ from one so well up in the subject as Mr. Dickinson, but I have seen both systems of cultivation and taking all the conditions obtaining, I am decidedly in favour of the English method of cultivation, as it is more easily and effectually supervised, it concentrates the damage done into a smaller area, the crop is more easily and more cheaply picked and the whole working of the estate more in accordance with science.

Mr. Finlayson dries the capsules partly by exposure to the sun and partly by artificial heat. The former is the better method, but, owing to the uncertainty of the weather, the latter, in the end, pays better. The cardamoms are bleached by exposing them to the dew for a couple of nights and then fumigating them with sulphur. Mr. Finlayson is naturally somewhat reticent as to the process his cardamoms pass through, for the supply is large and the market restricted and the competition from Ceylon, Travancore and Mysore is keen. Before picking, the capsules are carefully sorted and clipped. I am unable to give the cost of cultivating, picking and curing the cardamom under this system. It is finally packed in boxes and sent to the market.

The price of cardamoms has been steadily diminishing of late years. Rs. 14, to perhaps 'in a few instances' Rs. 18, per maund of 28 ℔s., is the average selling price of native-cured cardamoms. The English cured sell from Rs. 1-8-0 to Rs. 2-4-0 per ℔. The system in force in the days of the Coorg Rajas as regards the disposal of cardamoms was that the whole crop was handed in to the Government, who paid the cultivators a fixed price per maund and sold the crop for itself. The price paid was from Rs. 12 to Rs. 20, per maund. This was continued after the annexation of Coorg until 1846, when the malés were put up to auction and they are now leased, tenders being invited for a certain period of years. There is another class of malé in Coorg the Jama malé—the holders of which have a right to the produce on payment of rent which is assessed on the estimated yield.

The prospects of the native cardamom cultivators are extremely gloomy. Owing to several causes, the cultivators have been having a bad time of it lately. Falling prices, the enfranchisement of their slaves which necessitates payment of labour, and bad seasons, have all combined to render it impossible for many of the lessees to pay the rent they covenanted to six years ago. So bad has been their condition that the Local Government has had to allow a large number to resign and the condition attached to the acceptance of the resignation *viz.*, the payment of all arrears, has been found difficult to enforce.

It is a matter of extreme regret that a comparatively large number of families should lose their principal means of livelihood, but it is useless for the State to endeavour to oppose the laws of economics. Want of capital prevents these small malé holders from cultivating and curing their cardamoms in a paying way. The outturn is so poor in quality that it necessarily fetches a very low price when the beautifully cured capsule of the English grower is competing with it, and the problem will soon work itself out with this result, that the producers of native cured cardamoms will become fewer and fewer, until the produce they put on the market only suffices for the demand. For, strange to say, despite its inferior value and condition, there is still a demand for this kind and always will be, as long as there are people who, though desirous

of purchasing, can only afford to pay low prices and must therefore, perforce, put up with an inferior article. The slow extinction of the malé holder is a serious loss to the Forest Revenue, but, I fear, go he must, and the Department must look around for some fresh source of revenue to make up the deficit.

G. H. FOSTER.

ON CERTAIN EXPERIMENTS

MADE IN THE

Forest Nursery at Bellefontaine (near Nancy.)

by E. BARTET, Inspecteur Adjoint des Forêts.

The facts set forth in the following notes are the results of experiments carried out in the Bellefontaine Nursery on the raising of plants for forest planting. The nursery which was established in 1863 in the Forêt de Haye, nearly four miles from Nancy, and whose situation is defective from several points of view, constitutes one of the experimental stations attached to the Nancy Forest School.

Whether the observations which I have collected contain anything new and hitherto unpublished, and whether the reader will find in them anything other than the confirmation of facts already made known, I do not venture to affirm, so considerable are the numbers of works carried out in France and elsewhere on the subjects herein dealt with.

(1). On the use of sawdust and peat for covering small seeds.

At Bellefontaine, for covering small seeds, a mixture of mould leaves, well decayed manure and sifted earth, has for a long time been used. The preparation of such a compost is costly, the use of it has also other inconveniences, for when a period of drought follows after prolonged rain, it gets hard and forms a crust liable to interfere with the growth of small plants.

These considerations led me to try whether, for covering the seeds in question, sawdust and peat could not be used, these being two substances often obtainable in abundance and at a low price in the neighbourhood of forest land.

The first experiment to this end was made in April 1887 :— six trenches each 30 feet long being sown with Spruce Fir. The following were compared :—

1. Sawdust of Poplar, alone.
2. Peat alone.
3. A mixture of one part Poplar sawdust and one part mould.

4. A mixture of peat and leaf mould, in equal quantities.
5. A mixture of peat and sawdust, also in equal quantities.
6. The usual compost consisting of one fourth part leaf mould, one fourth decayed manure and one half well sifted mould.

Before using the sawdust, it was carefully saturated with water.

The results were quite as satisfactory in Nos. 1 and 2 as in the other lines and that as much so during the period of germination, as during the rest of the season of vegetation. It was even noticed that under nothing but sawdust, the seedlings of Spruce made their appearance earlier and more completely than anywhere else.

In the spring of 1888, another trial was made of the comparative effects on Spruce seed of sawdust alone and of the compost above mentioned, No. 6. The advantage was again on the side of the sawdust, although this had not been specially watered before using, it having been simply exposed to the rain for six months.

Finally, in the same year, 1888, the best and most conclusive results were furnished by a trial made on Spruce seed of very fine sawdust, not made from species such as Poplar, but from Oak. In spite of its being watered every two days, the working of the tannin into the soil in no way retarded either the germination of the seeds or the subsequent growth of the living plants.

It is therefore almost certain that sawdust derived from almost any species whatever might be employed in this way, provided that it is well saturated with water at the time of its being used.

When the sowings are made in lines, rather less than a pint of dry sawdust is required for a foot of trench.

(2). On sowing Oak seed in autumn.

The following process which is both simple and economical, has been entirely successful each time I have tried it. The sowing is made immediately after the natural fall of the acorns.

To preserve these from the attacks of rodents, they are coated with redlead by shaking them up in a bag or basket of this after wetting them.

After the acorns, well covered with this protective coat, have been dried, they are sown in trenches 1½ to 2 inches deep, about an inch of sawdust (wet or dry) well pressed down, being first placed over them and then about an inch of earth over that forming a slight mound. Thus protected, the acorns suffer nothing from the cold and the young plants appear at the beginning of June with the greatest regularity.

(3). Advantages of sowing Birch seed in autumn.

It is well-known that many authors recommend sowing Birch in autumn immediately after the ripening of the seed, in order to prevent its losing its power of germination. The experiment shows how thoroughly this advice was justified for the autumn sowing gave ten times as many plants as the spring sowings.

(4). Destruction of mole crickets.

Ever since I have had charge of the Bellefontaine Nursery, I have had to deal with a formidable invasion of mole-crickets which has given me the opportunity of experimenting on the various methods recommended by experts for the destruction of these pests.

With the exception of hunting for their nests and for the holes in which they take refuge, the only method which has been successful is that which consists in placing small pots with smooth and almost vertical sides, in the earth, in such a manner that the insects may fall into them in the course of their noctunral ramblings.

To place these traps along all the galleries would be practically impossible when one has to deal with thousands of these enemies. In such a case it is found best to proceed as follows.

The parts most infested should be enclosed with boards placed edgewise and buried 1½ inches in the soil, about 1 inch of their width remaining above ground. When the area thus enclosed is more than 120 square yards, it should be divided into compartments by a number of boards similarly disposed to those above mentioned.

It is then all along the sides of these boards inside and out that the pots are placed at 15 to 20 ft. distance one from the other taking care that the edge of each pot is a little below the level of the soil and that it touches the board very exactly.

In constructing their galleries the mole-crickets run against the planks and turn aside along these until they fall into the traps laid for them and from which they can be collected every morning.

The pots of the shape of an ordinary plant pot are the best, they only need to be about 6 inches deep and about the same width at the top, the bottom having a diameter of about half that. The hole to receive these can be conveniently made with a piece of wood previously prepared to the required shape and size.

It is perhaps superfluous to add that if ordinary plant pots are used, the hole at the bottom must be plugged up with something sufficiently hard to prevent the insects getting through.

Pots with thick rims should not be used, as with these the edge of the pot cannot be placed exactly against the plank.

Finally the pots must be kept free from earth, leaves and rubbish or the insects may escape.

(5). Trials of chemical manures.

..... The results were not conclusive.

(6). TREATMENT OF THE RED DISEASE IN PINE LEAVES.

At the commencement of the year 1888, I published, together with Doctor Paul Vuillemin, the result of experiments showing the efficacy of copper compounds for preserving the Scotch Pine against the "red" disease which is due to the attacks of the fungus *Histerium Pinastri*, (Schrad.) which affects exclusively the leaves of the year.

In these first experiments of 1886 and 1887 I restricted myself to the Scotch Pine, and the Bordeaux mixture used in these experiments contained according to the primitive formula of M. Millardet, 16 pounds of sulphate of copper, 32 pounds of lime and about 3 lbs. of isinglass to about 22 gallons of water. This paste was applied to the plants like whitewash, twice a year, with broom or brush.

On continuing the study of this question, I ascertained that at Bellefontaine the Black Austrian Pine was affected almost in the same degree as the Scotch Pine and that the seedlings of these species were liable to be attacked and killed by the fungus within the year of their germination. I also made fresh trials to compare different copper compounds and different modes of employing them also varying the number of applications per annum.

These trials, of which the details cannot be enumerated here, led me to the following conclusions.

1. Of the various formulæ of Bordeaux mixture capable of being utilized, the two following gave the most satisfactory results.

No. I.	Sulphate of Copper	...	... lbs.	8
	Lime	...	... „	8
	Isinglass	...	... „	2½
No. II.	Sulphate of Copper	...	... „	12
	Lime	...	... „	8
	Isinglass	...	... „	2½

Both the above are quantities per 22 gallons of water. Formula No. I. should be used for the first or two first applications made at the beginning of the season of vegetation, when the young needles are still young and might suffer from a too concentrated wash of the sulphate. Formula No. II should be used in subsequent applications.

In raising the quantity of sulphate of copper to 16 lbs. without increasing the amount of lime, I noticed that the leaves were burnt.

2. Burgundy mixture (sulphate of copper, and carbonate of of soda 2½ lbs. of each to every 22 gallons of water) I found less efficacious than the Bordeaux mixture, probably on account of the smaller proportion of sulphate used.

3. Copper sulphosteatite (made by mixing powdered talc, sulphate of copper and water) much used by vine growers in the South of France to prevent mildew, gave but poor results in spite of

washings made every 15 days. The smooth leaves of the Pine are not able to retain this powder long in the wet climate of Bellefontaine.

4. The Bordeaux mixture can be applied either like whitewash with a brush or by means of a sprinkler such as is used for the treatment of mildew in the South. What is important is that each leaf should receive a wash of the mixture.

The use of a sprinkler is the more economical mode.

5. In dealing with either Scotch Pine or Austrian Pine, treatment with a view to the prevention of the red disease should be begun while the plants are yet in their first year of growth and must be continued so long as they remain in the nursery.

For seedlings under one year old, the first application of the mixture is made a few days after the appearance of the plants above ground ; for those of one year old or more it is better to wait till the new needles have attained about $\frac{1}{3}$ of their length. The other applications are made at intervals of three weeks or a month ; they should be more frequent at the beginning of the season of vegetation than in the middle of summer ; exceptionally abundant rain may also render more frequent applications necessary.

At Bellefontaine, where this disease has prevailed for some time and has exceptionally favourable conditions for its propagation, 3 or even 4 applications should be made every year, when the latter part of the spring and the beginning of the summer are wet.

(7). Seed of the Weymouth Pine.

..... Weymouth Pine seed should not be sown in a Nursery without first putting it through a process of preparation by some method or other of 'stratification.' This is excellent advice and I think with M. Pierret (the author of the above) that the practice of stratification would be of great advantage for many other species as well, both broad-leaved species and conifers, and more particularly for the larch and beech.

So far as concerns the Weymouth Pine, each time I have sown it, after simply having submitted the seed to immersion in water, the results have been unsatisfactory, even with a previous immersion of 15 days, the soil also being irrigated. Under such conditions, sowing the seed at the end of April or commencement of May, I have always noticed the following peculiarities.

Germination took place slowly, commenced before the middle of June, and continued until August, the crop of seedlings being anything but abundant ; the seed is thus exposed for some time to the attacks of rodents and birds. Moreover, whatever precautions are taken, several of the young plants are destroyed as they appear, either by birds or yb the heat, whereas those that come up latest succumb to the cold of winter. Finally, only about 17 plants remain per square yard of ground sown. As compared with this, last year I obtained a most successful result by means of stratification carried out as follows.

In order to avoid any chance of mould later on, the seeds were first placed in a solution of sulphate of copper (3 per cent concentration) for 24 hours, then on the 12th of March, the seeds were spread in a bed ¼ inch thick between two layers of wood sawdust well wetted, each layer being 1 to 1½ inches thick.

The box containing the whole was then placed in a room dimly lighted and not warmed, care being taken to maintain the moisture of the sawdust by occasional light waterings.

On the 14th May, *viz.* two months later, the first signs of germination appeared. The seed was then separated from the sawdust and sown in trenches. In less than 15 days the young plants came up in masses in as great abundance as is the case with Scotch or Austrian Pine.

(8). Peculiarity of Elm Seed.

It is well-known that when Elm seed is sown immediately after its dissemination (May or June), the young plants appear after some days. To obtain the best results, the seed has, however to be covered but lightly.

If, on the contrary, the seed is covered with a layer of 2½ to 2¾ inches of earth, as I covered it in an experiment made in 1890, but few plants appear in the same year, the majority of the seedlings coming up in the spring of the year following the sowing. Moreover, the total number of plants obtained is less than that furnished by the method of covering lightly.

Perhaps the above may be of use in arriving at some practical method of preserving Elm seed.

(9). Cutting back of badly grown Oak plants.

The Oak plants referred to here were taken out of the Nursery at Bellefontaine when one year old and replanted in a temporary nursery in the Forêt de Haye where, during the two following years (1885 and 1886). they were so seriously damaged by spring frosts that the stems of many of them practically did not develop at all.

Towards the end of April 1887 it was considered necessary to transfer them to another temporary nursery less exposed to frost that the first.

The smallest and most badly grown of the plants (many of which were barely 3 inches high) were cut back level with the ground immediately after transplanting, while the larger ones, measuring 8 to 10 inches were transplanted and left just as they were.

Two years later the shoots of those which has been cut back constituted a group as vigorous and of as favourable an appearance as the others. It was even among them that the largest plants were to be found.

The result of the cutting back was therefore excellent. Is must always, however, be remembered that if this operation it

intended to re-establish equality in the size or more correctly in the height, of the stems, it is not capable of producing the same effect in the weight of the plants. This is shown by the following figures furnished by two groups of eight oaks thoroughly representative of the two lots compared.

	Plants which were cut back.	Plants not cut back.
Average height of stem above collum ...	21 in.	21 in.
Average weight of an air-dried plant (stem and root) ...	¾ oz.	1 oz.

This difference in the weight of the plants arises from the root system as well as the aërial organs, for plants which were not cut back were manifesty more thick set, better branched and better provided with roots than those which had been cut over.

(Translated and abridged by A. F. G.)

NOTE.—It is perhaps hardly necessary to remark that the inferiority of the root system of the plants of the first lot should not be attributed to the operation of cutting back, for not only did this inferiority exist at the time of the operation but it was much more pronounced then, than at the time of the weighing above referred to.

The Cutch tree in Upper Burma.

At present the only protection afforded to Cutch is *(i)* it may not be felled for sale or use as fuel ! *(ii)* no cutch trees under three feet in girth may be cut for cutch boiling. With these two exceptions, Cutch trees may be cut wholesale for sale or use as house posts, cart-axles, &c.

This hard-and-fast sort of girth restriction is not capable of practical application. Right in the centre of Burma, from the north of the Magwe, Minbu and Pyinmana districts up to the north of the Mandalay district, there is a ' dry zone ' embracing the eastern parts of Minbu, and Pakokku, the South of Sagaing and Mandalay, the western parts of Kyaukse, and the whole of Yamethin, Meiktila and Myingyan. With this dry zone there are hardly any true forests, as we are accustomed to find them in the moister parts of Burma. Where not under cultivation, the soil is covered with an open scrub jungle in which many species of Acacia are noticeable. Even with the isolated positions of the stems and the consequent full development of crowns, with full enjoyment of light and air, the rate of growth and the development of and quality of the cutch-producing heart wood are both inferior to that in the moister tracts of South Pyinmana, southern Magwe, and western Minbu. In the district townships of these dry-zone districts, or where the soil is not good, it is more than questionable if the Cutch ever attains anything like the large girth which would make the fixing of a three feet girth a reasonable minimum below which the felling of green

trees should be prohibited. From observation it has been noticed that in many tracts the trees dry and die without reaching that girth. In fact it is open to considerable doubt if the cutch generally occurring there may not be another species than the true *Acacia Catechu*,—a view which is corroborated to a certain extent by Kurz, at page 422, Volume 1, of his "Forest Flora of British Burma."

With a view to establish comparisons as to rate of growth of cutch, the following data have recently been collected :—

District.	Character of Forest.	Quality of wood.	No. of Annual Rings.	Girth.	Diameter of heart wood.	Average annual girth in amount.
		Dry Zone.				
Yamethen .	Dry open forest	Lighter than Pyinmana	8	0′ 9½″	...	1′2 ″
	,, ...	Ditto ..	15	0′11¼″	...	0′75″
	,, ...	Ditto ...	rotten.	3′ 9 ″	...	(?)
	,, .	Ditto ...	15	3′ 3 ″	...	2′ 6″
Meiktila .	Scrub jungle	Medium in colour .	7	1′ 1 ″	...	1′ 9″
	much cut over	Light in colour ..	5	1′ 2½″	1¼″	2′ 9″
	for Ry. fuel in	Ditto ...	5	1′ 1 ″	1 ″	2 6″
	1887 ..	Ditto . .	5	1′ 1½″	1¼″	2′ 6″
	,, ..	Medium in colour ...	9	2′ 2½″	5¾″	3′ 0″
	,, ...					
	,, .					
	,, .					
		Intermediate zone.				
Meiktila .	Scrub jungle	Light in colour,	15(?)	2′ 7 ″	7½″	2′ 0″
	near base of hills	.	19(?)	2′10 ″	7½″	1′ 8″
	on good soil ..	Rings very indistinct.				
Yamethen	Mixed forest, verging on moist zone ...	Resembling specimens from South Pyinmana ...	15	3′ 7 ″	...	2′ 8″
		Moist zone.				4′ 0″
Pyinmana .	Lower dry forest	Lighter than specimen	7	2′ 4 ″	...	3′ 3″
		from Minbu ...	9	2′ 6½″	...	3′ 7″
	Mostly coppice	.....	7	2′ 2 ″	...	3′ 6″
	Growth in pônzôs	.....	9	2′ 9 ″	...	
	Lower mixed forest .	Ditto ...	11	3′ 2 ″	..	3′ 4″
	Lower (different locality) ...	Ditto ...	12	3′ 3 ″	8 ″	3′ 2″
			9	3′ 4 ″	9½″	4′ 4″
	Savannah forest.	Ditto ...	9	2′ 4 ″	...	3′ 1″
			9	2′ 8 ″	..	3′ 5″
			11	3′ 2 ″	...	3′ 2″
Minbu ...	Not stated ...	Heart wood dark, almost chocolate coloured and full of "*ugyi*" Annual rings very indefinite ...	11(?)	2′ 7 ″	6¼″	
			14(?)	3′ 2½″	8 ″	

Imperfect and incomplete as these hastily collected data are, they show that, on the whole, growth in the moister tracts is considerably quicker than in the dry zone, and that the heartwood in the former appears richer in cutch than in the latter. In the former, a girth of 3 feet is attained after about 10 to 12 years with a diameter of about 8 inches of heartwood.

The Pyinmana specimens shew somewhat quicker growth but not such rich heartwood or abundance of '*u-gyi*' (cutch cells) as those from Minbu. This is probably due to the fact that the taungya system of cultivation is more generally preserved in the former, and that the bulk of the existing supplies of the timber is obtained from coppice shoots. Cutch is decidedly light-loving, and when coppice shoots get the full enjoyment of light, air and sunshine in pônzôs (old clearings) they grow with great rapidity; seed too then gets a chance of germinating on the clearance of the overshadowing canopy.

This fact of the exiting supply of cutch wood being located in tracts where taungya cultivation is general in the Pyinmana and Yamèthen districts, would point to the advisability of reserving cutch tracts. This, however, the Deputy Commissioner does not approve of, as the land is all practically of culturable quality, in proximity to the railway line, and likely to be required for permanent agricultural occupation at no very distant date. Even the Forest officer writes that he sees "little possibility of having the greater part included within reserved forests." In the Pyinmana and Yaméthen Districts there are from 30 to 36 thugyiships (revenue circles) in which cutch tracts occur, and if it were only possible to open 3 of these each year for cutch boiling and taungya cultivation simultaneously, so as to work with a 10-12 years' rotation, we should always be certain of a good supply of cutch. The trees coppices up to 3 feet girth, although it is questionable if they can reproduce themselves from the stool beyond that age, and seed is shed from about the 5th to the 6th year. As, however, the villages, whose inhabitants adopt taungya cultivation partly, are permanent no such system can be introduced. At present, thousands of saplings and young trees are killed year after year by the firing of the yas even when the cutch is not felled along with the rest of the jungle at the time of clearing.

On the Magwè side, the cutch tracts have been overworked to such an extent that all cutch boiling has this year been stopped to allow the localities to recover themselves. On the Pyinmana and Yamèthen side, the tracts have also been much overworked during the last three or four years, but in order to alleviate the distress that is certainly wide-spread among the forest classes this year, this overworking is being continued (within certain limits) this year also,—only however for the benefit of actual residents. Recent valuation surveys in the Pyinmana district shew only the following stock :—

Valuation Surveys.		No. of cutch trees.			Average No.
No. held.	Area counted out in Acres.	3′ in girth and above.	Under 3′ girth.	Total.	Per Acre.
45	1,814	146	5,977	6,123	3·37

A great deal of the cutch produced in the Meiktila and Mandalay districts is 'sha byāw' (soft cutch) and not 'sha-mā' (firm cutch) It is sent to Rangoon, consigned to Chinese firms, in its semi-viscous condition, looking like thickened crude earth oil, and there re-boiled along with other hard cutch—or probably with *than* (Terminalia Oliveri) bark, or bark extracts if the truth were known.

The following data relative to the outturn of cutch have been collected for me by Mr. Copeland, D. C. F., Pyinmana :—

1. A prepared log, *i.e.*, freed from bark and sapwood, of 8′3″ × 1′10½″ yielded chips filling 8¼ chatties tightly packed.

2. Twenty chatties of cutch chips, decocted twice, as usual, yielded in 24 hours 5 viss 70 tolas of viscid cutch, of quality below medium and selling in Pyinmana at Rs. 32 per 100 viss.

3. Transport of cutch from camp to Pyinmana is from 8 annas to Rs. 1 per 100 viss.

4. The preparation of the cutch log took 1 man ½ an hour, and the chipping 3½ hours. It is considered a fair day's work for a man to prepare and chip enough wood to keep one cauldron going. His wages may be reckoned at 8 annas per diem.

5. The cost of delivering in camp 100 logs similar to that in No. 1, is Rs. 15.

6. Additional help is required for tending the cauldron, generally the wife of the chipper, who may be reckoned at 4 annas per diem.

Deductions from the above data are :—

1. Each cauldron uses up 5·34 cub. ft. (true measurement in short sections) of heartwood per diem and produces 5·70 viss of cutch.

2. The cost of production of 5·70 viss of cutch is :—

Delivering timber ...	...	Rs.	0	6	0
Chipping heartwood ...	...	„	0	8	0
Tending cauldron ...	...	„	0	4	0
Packing in cases of baskets	...	„	0	1	0
	Total Rs.		1	3	0

3. The market value of the 5·70 viss of cutch at Pyinmana, at Rs 32 per 100 viss, but deducting Rs. 1 for transport from camp, is Rs. 5·7 × 31 ÷ 100 = Rs. 1-12-3.

4. The nett profit per diem after allowing wages to the worker, his wife, &c., amount to Rs. 0-9-3, or Rs. 15-0-6 per month of 26 working days.

5. The amount of cutch timber consumed in a year of 200 working days would be 5·34 cub. ft. × 200 = 21·36 tons of heartwood or of growing timber = 50 tons probably. In a year of 270 days, 5·34 cub. ft. × 270 = 28·84 tons of heartwood or of growing timber = 66 tons probably. Under the circumstances described, it seems the best thing that Catechu should be declared a reserved tree, and that licenses for the preparation of cutch should be issued subject to the following conditions :—

(i) No license to be issued for more than one cauldron, and no individual to obtain more than one license.

(ii) Licenses only to be issued to villagers resident in the township where the cutch boiling is to take place.

(iii) No license to be issued to any one who has a license for the preparation of bark extracts.

(iv) License fee to be Rs 5 p. m. prepaid monthly.

(v) No green catechu trees to be cut less than 3 ft. in girth at breast height, except in such districts, and only in such townships of said districts, as may be sanctioned from time to time by the Conservator of Forests.

(vi) Contravention of rules at any camp to involve forfeiture of all the cutch boiling licenses at said camp.

Hitherto, in a great many instances, licenses have been taken out by men from lower Burma who simply employed the coolies on job work paying them about Rs. 4 per 100 viss of cutch and giving them food-supplies during time of cutch production. For this reason a monthly prepayment fee is proposed, instead of a lump sum, thereby probably enabling the villagers to have licenses independently of brokers and middlemen.

J. N.

A Japanese Timber Slide.

When in Scotland in 1884, I visited the Edinburgh Forestry exhibition and among the many interesting exhibits from Japan, noticed a model of a timber slide, a few notes on which may not be uninteresting even so late as now.

wall, against which the timber strikes violently on turning and is prevented from moving out of the proper course. In this way

The model showed the way in which timber is transported out of deep mountain forests. When the trees of the genus *Pinus* are felled and dressed into baulks they are collected is one common place, which is called 'Seridashi.' From this place they are to be transported out by means of an elevated floor known as 'Sade.' This is constructed by the side of a declivity where the transport becomes very difficult on account of the road being very narrow and uneven. In the first place, a kind of gate is built with two large pieces of timber which cross each other at the top and against this gate timbers are inclined forming a sort of fence called 'Tome' meaning "timber obstructor." One day this gate is closed to collect timbers and on the next it is opened to send them to the Sade, so that the gate is shut and opened on alternate days. Just outside the Tome or gate, timbers are horizontally arranged for 6 or 8 yards, called 'shura' and this is continued as far as the Sade proper. For the construction of the 'Sade' a support called 'Toriidai' is first built of two pillars to which a horizontal beam called 'Udegi' 2 to 4 yards long is fastened. Such supports are built at the distance of 6 to 8 yards from one another, their heights being altered to form the desired inclination. Then a long piece of wood called 'Sao' is stretched from one Uuegi of one support to that of another on both its sides and the distance between two Sao is about five feet. Across the Sao trough shaped timbers called 'Tonkase' are fastened; and parallel with them, beams of three to four inches diameter are arranged at the distance of one foot from each other. These latter are called 'Yorai' and twigs of 'Hinoki' (*Thuya dolabrata*) are woven across them, the ends of the twigs always projecting below, so as to leave the upper surface smooth. These are then firmly fastened by timbers fixed on both sides called 'Kategi.' The space between two Kategi is about three feet, and this forms a floor on which the timber slides down. Such an arrangement is known as 'Tamba Sade.' There is another called 'Nora Sade' in which the sliding surface consists of 'Sawara' (*Thuya pisifera*) boards one foot four inches broad and 4 feet five inches thick instead of net-work. In both cases Kateji and Tonkase are supported by pillars to make than firm. 'Tamba' Sade is constructed at those places where the inclination is not very great, while the 'Nora' is better fitted for greater inclinations. For bending the course of the sliding floor, an arrangement known as 'Usu' is provided. This consists of a sort of elastic wall built of the bark of the *Thuya dolabrata* at some distance from the Sade and in front of this wall a pale inclined at an angle of about 45 called 'Suribo' is provided. Now a piece of timber on coming to the extremity of the sliding floor dashes against the wall or usu, but one of its ends rests on the inclined pole or Suribo, so that this end immediately slides down the pole and enters on a second floor. There is another inclined pole called 'Koshinchibo' by the side of the

4 to 5,000 pieces of timber can be transported in a day. Sometimes, however, timbers get stopped on the way, hence labourers are distributed here and there to manage them. There are also two or three persons stationed at high places, who watch how the timbers get down and in case they slide down too fast or if there happens to be any obstacle, they report the matter to the Tome to send out wood more slowly or to stop entirely. In case of Nora Sade, the velocity of the sliding timbers is great and they often jump out of the proper course, hence, to obviate this inconvenience, an arrangement called 'Noren' is provided, which is made by hanging timbers from a cross-bar built over the floor, so that their ends rest on it, and the pieces on sliding down must creep under them : thus the velocity gets much slackened, and their falling off is prevented. If, on account of the inclination of Sade being too great, the timbers slide down too fast the floor is covered with fine earth which, causing friction, slackens the speed—if the contrary be the case, water is sprinkled on the surface to make the timbers slide quicker. The construction of Sade requires a great deal of material as well as of labour, so in places where there is a stream that can be made use of, advantage is taken of it even for a short distance and the mode of transport under such circumstances, goes by the name of 'Shuradashi.' For constructing it, timbers are first piled in a slightly concave form at the extremity of the sliding floor. When timbers that are sent down are collected all along the sides of the stream, other timbers are arranged longitudinally, and to make the water as as deep as possible, a weir is built at the lowest part by piling up timbers in many layers called "Segi." This consists really of two parts, the lower and the upper, called respectively 'Takasegi' and 'Uwasegi.' The lower one is made by piling up timbers horizontally and the Uwasegi is constructed by heaping timber in a slanting position. All the crevices through which water flows are carefully stopped by inserting weeds, tufts of moss or leaves of plants, and by this means the shura is watered as far as possible, and timbers sent down and when they come to the segi or weir they are transferred to the next shura by men. All the timbers used for the construction of the several parts are eventually themselves brought out, commencing with those at the uppermost place. Sade and Shura are most economically used for the transport of about 30,000 timbers, because the expenses of construction and the number of men required are the same for as for a less quantity of the timber. But if the number of the pieces of the timber to be dealt with comes to as many as 40,000 or 50,000, many things get mixed up and cannot be managed properly. The whole construction requires a most experienced person to manage it, otherwise, not only is much time spent in transport but many parts happen to break and during the time of mending, labourers must be paid without any work to do, which causes a great loss.

R. C. W.

II.—CORRESPONDENCE.

Forest Administration in the Central Provinces.

SIR,

"Tuscan," in your October number, though he, in the beginning of his article, gives a very good reason why the Divisional Forest Officers in the Central Provinces have been unable to make any working plans for their forests for he mentions the enormous areas in charge of each officer, is somewhat hard on the Department. He is also incorrect in one or two minor matters and as to working plans, simple plans of rotation of felling were drawn up and sanctioned in two large forests in my charge. Of other divisions I cannot speak but before I left the Provinces, I had prepared data for the working on the same system of another forest of sixty square miles. Still, I must admit that Tuscan's strictures are merited to a certain degree, and that more might have been done in the way of simple plans which would have restricted the fellings to certain defined areas and to certain age classes and thereby prevented damage being done by indiscriminate cuttings uncontrolled and unlimited. But the part of Tuscan's letter which I wish to notice is the last. Is it not possible to devise some scheme which, while controlling the exploitation of the Forests, will relieve the populace of the harassing rules in connection with the purchase and use of licenses, and the Department of the awful incubus of license accounts and at the same time, secure a revenue worthy of the enormous area in charge of the Department; and this without reverting to that barbarous and, as all Central Provinces Forest Officers thought, by-gone system of commutation?

I myself believe such is possible. That we will ever be able to do away with licenses in the Central Provinces I most deferentially beg to deny. The populace has to resort to the Reserved Forests for such a very large proportion of their forest wants and their transactions are each on such a small scale, that the license, objectionable as it may be in some person's eyes—must be retained. But the present system of sale and accounts should be and can be abolished. Last year a system of adhesive stamps was proposed,—put into practical shape and—for some unknown reason to me,—put aside. This would have relieved the Department of an immense amount of account and facilitated the purchase of licenses to the public, but it was insufficient.

Briefly, my suggestions are, that the forests, those which it is intended shall be permanently maintained as such, be divided into two classes, one to supply large timber, the other small building wood and firewood. The first class would be worked under carefully prepared working plans which would have the creation of high timber in view, the second, on much simpler lines, laid down to secure a good growth of poles, the demand for which is enormous. This second class should be the one first taken in hand. The classification of the forests should not be a difficult matter. The forests of the Central Provinces are now nearly all well-known and the only point to be kept well in view would be, not to include in the first class any but those forests in which the growth of large timber is certain. Thus it might possibly happen that all the forests of a division would be in the second class.

Having classified the forests and fixed a cycle of rotation, the next point would be the control of the collection of revenue. In the first class of forests, as all cuttings would be most rigidly limited, this question would be easily answered; but the problem in the second class is not so easy, for we have to prevent fraud and yet allow access by the public to the forests with as little restriction as possible. I would fix the limits of the coupe, the age class of trees to be felled, or kinds of trees, the meaning of "firewood" and what may be felled as such, and them guard each coupe with a sufficient number of Forest posts located either on the edge of the forest or wherever most convenient. I would then issue tickets for sale at Treasuries, Police Stations or with private vendors who would have absolutely nothing to do with the executive staff of the Forest Department. These tickets would represent so much money and would be available for any produce whatsoever. The intending remover having purchased tickets representing the value of the produce he wishes to remove, would go into the open compartment or block, cut what he wanted and on his way out exchange his ticket for a small pass representing the quantity and kind of produce removed. These tickets would be available at any time, so that a man might purchase a lot when in funds and use them up as he wanted forest produce. The pass he would obtain in exchange would have everything printed, the only entry made on it at the time of exchanging it for a ticket being the date. It would be in duplicate and from the foils, accounts of the quantities and kinds of produce removed might be made up. The tickets would be equally available for grazing.

I think that this scheme would meet the wants of both parties. Working of the forests would be regulated and controlled, statistics of yield obtained, and the payment for and removal of produce subjected to a minimum of trouble. What say the Central Provinces Foresters to this?

7th November, 1892. KODAGU.

Seeds of the Sugar Maple.

MY DEAR SIR :—

In the September number of the *Indian Forester* you request some subscriber to give you the name of a Canadian or American Seed dealer from whom you can obtain the seeds of the *Acer saccharinum*. It gives me pleasure to send you the name of the firm of Thos. Meehan & Son of Germantown, Philadelphia, Pa., from whom you can obtain the seed required. I am afraid, however, that it will be a matter of uncertainty as to its arriving in proper condition for germinating, as the seed must be planted as soon as ripe. However, it is worth the trial.

If we can at any time give you any information in regard to the trees or forest conditions of the United States, I trust you will not hesitate to call on us.

I am, Sir, &c.,

JOHN D. JONES,

Assistant Chief of Division.

U. S. DEPARTMENT OF AGRICULTURE,

Division of Forestry.

The flowering of Bamboos in Travancore.

SIR,

The following notes may be interesting :—*Bambusa arundinacea* flowered in South Travancore in 1816-17 according to Lieut. Ward, then engaged on a survey of the country. It flowered again over the same area in 1869-70. Throughout the northern half of the State this bamboo flowered in 1880-81.

Oxytenanthera Bourdilloni, the thornless hill-bamboo, flowered in 1888-89.

Teinostachyum Wightianum, a hill reed, flowered everywhere in 1887-88. It is said to flower only at very long intervals.

Ochlandra travancorica is said to flower every seven years. Different valleys flower at different times.

T. F. B.

III.—OFFICIAL PAPERS & INTELLIGENCE.

Rules for obtaining Photographic Records of selected Forest areas.

In order to illustrate the results attending the protection of forests from indiscriminate cutting, lopping, grazing, and especially from fire, as well as to indicate the progress of plantations or other reboisement works, it has been decided to start a system of photographic records for selected forest areas. Photographs of these areas will be taken periodically, and it is anticipated that the series of views thus obtained will be a most valuable aid in showing the results which may be and are obtained from forest protection. Forest officers are frequently met with the remark that in specified localities forest protection can yield no material or beneficial results ; and occasionally the pendulum of official opinion and action swings backwards because no more convincing proofs of progress can be adduced than written records, often those of foresters who have retired, and evidence of this kind is not always accepted.

It is desirable, inorder to obtain the best results, that, as a rule, photographs should be taken (1) of areas at the time they are first protected from fire or closed to grazing &c. ; and (2) of areas which have been protected for some time, and which it is decided to throw open again to grazing, &c. To carry out this purpose, two cameras, together with all materials necessary for taking photographs in camp, will be supplied by Government, and the following rules are laid down for the use of the cameras and for guidance in taking photographs :—

1. One of the cameras will be under the charge of the Director of the Imperial Forest School, and the other under the charge of the Superintendent of Forest Surveys. Both cameras will be available for use in any part of the Bengal Presidency, and Conservators desirous of having a photograph taken of any special locality should apply in the first instance to the Inspector-General of Forests, stating the object of the proposed photographic record, as well as the name and the qualifications in photography of the officers whom it is proposed to entrust with the camera. The Inspector-General of Forests, if he approves of the

application, will then arrange, either with the Director of the Forest School or with the Superintendent of Forest Surveys, for the supply of one of the cameras.

II. The Director of the Forest School will determine, as regards the camera under his charge, what photographs should be taken for purposes of instruction at the School, and by which of the School officers the record will be made. If the camera is sent out with a party of the School students under the Deputy Director or an Instructor, the officer in charge of the party will, in communication with the local Divisional Forest Officer, select for operations such places as it may be considered desirable to photograph, reporting what he has done to the Director.

III. Similarly, the Superintendent of Forest Surveys will determine how, and by which of the officers serving under him the camera in his charge is to be employed.

IV. In order to ensure that for each locality of which a record is made, the same field of view may be obtained, the spot at which the camera was originally set up should be durably marked by a permanent benchmark, or, if this is impossible, by a record of the exact distance of the spot from each of two permanent bench-marks. For purposes of comparison, the camera should always be set up for each locality considered at the same height from the ground, and each successive photograph of the same series should embrace the same field of view.

V. The interval between the taking of two successive photographs of the same locality will ordinarily be five years ; otherwise the interval will be that recommended by the first operator and approved by the local Conservator. All successive photographs must be taken at the same season, and as nearly as can be on the same date.

VI. In order to better illustrate the rate of growth of vegetation, arrangements should be made either (*a*) for a graduated levelling staff, or pole with divisions and figures in feet clearly marked upon it, to be placed in a conspicuous position in the fore-ground on a previously constructed bench-mark, or on a site definitely fixed by angle and distance measurements from the camera bench-mark, so that it may be possible, with the aid of a magnifying glass, to read the figures on the photograph ; or (*b*) for a small group of the natives of the locality to be stationed at a similar place in the foreground, with a few others, if desired, scattered at various other points in the field of view.

VII. A register of particulars will be maintained by the Divisional Officer (copy being kept in the offices of the

Director of the Forest School and the Superintendent of Forest Surveys respectively), in which will be recorded in suitable columns—

(*a*) the number of the negative and size of plate ;
(*b*) the date and hour of the day ;
(*c*) the position of the bench-mark or marks as required by Rule IV ;
(*d*) the height of the camera-stand from the ground;
(*e*) the needle bearing of the edge of the camera ;
(*f*) the position of the bench-mark of the measurement staff or of the group referred to in Rule VI ;
(*g*) the general state of weather at the time, especially as regards cloud [the size of 'stop' used should be noted] ;
(*h*) a short description of the locality and its vegetation ;
(*i*) the special reasons for which the photographs were taken, with any additional information, such as the dates of closing of the tract to fire, grazing, &c. ;
(*j*) the period recommended as best to be adopted between each two successive photographs ;
(*k*) the name of the operator.

A special page or pages should be set apart for each view taken, so as to allow of easy comparison between successive entries. A copy of the entry should be deposited in the office of the Conservator of Forests of the Circle in which the place is situated, so as to provide against the possible loss of the register.

VIII. The negatives taken should all be numbered serially in agreement with the numbers given in the register, and should then be sent to the Photographic Office of the Survey of India Department, Calcutta, where they will be stored, and from whence prints will be obtainable on regular indents. A copy of each photograph taken should invariably be supplied by the Conservator, &c., as the case may be, to the undermentioned authorities :—

(i) Inspector General of Forests.
(ii) Director of the Forest School.
(iii) Superintendent of Forert Surveys.
(iv) Conservator of the Province or Circle.
(v) Divisional Forest Officer.

IX. When the cameras are used for private purposes, such as photographing camps or other views not necessary for the requirements of the Forest Department, Government plates and other materials must not be used for negatives or for the printing of photographs.

Review of Forest Administration in British India,

FOR 1890-91.

BY THE INSPECTOR GENERAL OF FORESTS.

This publication has come so late that we hardly think it necessary to review it. But as there are many statements of the greatest interest, we prefer to select from these for the information of our readers and especially of those at a distance.

(1) IMPORTANCE OF BRINGING ALL FOREST AND WASTE LANDS UNDER THE ACTS.

"In several provinces extensive tracts of waste lands still 'exist, which, though they belong to the State, have not as yet 'been brought under the control of the Forest Department, or 'under any other systematic control. There are no means at the 'disposal of the Local Governments by which a conservative 'management of such lands can be secured as effectively and with 'such perfect justice to all parties interested as by reservation 'under the Forest Act, and the reason why this course has not 'be more widely followed lies presumably in the fact that all State 'lands finally settled under the Forest Law are denominated "Re-'served Forest," and in the belief which arose, as a natural conse-'quence of this name, that the Local Governments would utilize 'such areas only for purposes of Forestry. This, however, is not 'the case, and it rests with local authorities to use their settled 'State lands in any way they may consider most advantageous to 'the general welfare of the people and to the revenues of the State, 'so long as such use does not interfere with vested rights on the 'one hand, or the proper maintenance of the forests on the other. 'In order to enable them to gauge with greater certainty the ad-'vantages of a wider application of the procedure for the settle-'ment and reservation of State lands, the Government of India 'have issued, during the present year, an important *Circular*, *No.* '17—105 (*Agri.*), *dated* 15*th July*, 1891, asking Local Govern-'ments to analyze the State lands district by district, and to 'classify them in accordance with main purposes which they should 'serve, and for which they should be systematically treated.

'There is no doubt that under the idea that Reserved Forests 'were intended merely for the growth of timber and fuel, only 'such areas were as a rule selected and reserved as either answered 'that purpose or were considered necessary for the protection of 'hill-sides and the underlying cultivation dependent on such pro-'tection. Nevertheless, it is quite possible that areas were includ-'ed, especially during the earlier period of reservation, which are 'fit for permanent and selfsupporting cultivation, such as would 'require no support in the shape of forest rights or other conces-'sions over land outside the limits of the cultivated area. Under

'these circumstances, provided the forests are sufficiently exten-
'sive to meet the demands made on them for forest produce, and
'are not required for protective purposes, there is no reason why
'such lands should not be let out for cultivation, or be even alienat-
'ed ; for it is in the interest of the State revenues and the forest
'administration to develop and increase the local markets for the
'consumption of forest produce. The importance and value of
'fodder reserves created for that purpose are largely increased by
'their proximity to cultivated areas. Such supply not only a
'market for the produce of the reserve but the labour necessary for
'the cutting and gathering of the crop. Every forest area, closed
'against grazing, may be used as a fodder reserve as soon at the
'young tree growth has sufficiently advanced in size to escape be-
'ing cut with the fodder grasses. Areas should only be classed as
'*bonâ fide* pastures, which either bear no forest growth for climatic
'reasons, or the protection or afforestation of which is of no con-
'sequence to the surrounding country. In connection with the
'pastoral requirements of agricultural communities, two facts must
'always be kept in view, the first being that such requirements can
'to a great extent be met from State lands, even under a sylvicul-
'tural treatment, by keeping open to grazing a certain portion,
'varying according to circumstances between 30 to 60 per cent ; the
'second, that with the advance in agriculture, and consequent in-
'crease in the culture of fodder crops which occurs in every peace-
'ful and well administered country, the demands on pastoral lands
'and forest-grazing diminish."

(2). WORKING PLANS AFD IMPROVEMENT FELLINGS.

"It is under present circumstances undesirable that the more
'or less stereotyped pattern of working-plan of continental Europe,
'especially that of Germany, which has developed to a great extent
'simultaneously with a system of equi-aged crops, should be grafted
'on our Indian Forest Administration, as we have in this country
'almost invariably to deal with forests in which the age-classes are
'intermixed, and which, consequently, require a more natural and
'less constrained treatment.

'No doubt a very large proportion of our Indian forests are in
'the same condition, and frequently in a worse state than that
'which, in the latter half of the last century, led, on the Continent,
'principally in Germany, to the more or less general adoption of
'the treatment under equi-aged crops. The former have been in
'most instances ruined by centuries of mismanagement and are even
'now subjected to extensive—frequently excessive—grazing ; and
'this makes it doubtless necessary that the reproduction and young
'growth should, as far as practicable, be concentrated within de-
'fined areas in order to render their pretection and proper treat-
'ment feasible.

'To a great extent, however, this purpose can be arrived at by
'a mere localization of the exploitation of the forest and by a rota-

'tion of fellings, and, consequently, by a treatment based purely 'on area and the sylvicultural requirements of each component part 'of the forests. In the great majority of the Indian forests, especi- 'ally in regard to those which have been subjected to fires, over- 'grazing or periodical cultivation, the most suitable sylvicultural 'treatment consists without doubt in improvement fellings, more 'or less severe as demanded by the local conditions of climate, 'position, soil, and the character of the existing forest. It goes 'without saying that the areas thus treated must be closed strictly 'against grazing for a period sufficiently long to admit of the young 'growth outgrowing all possibility of damage from this cause, and 'it is this consideration which to a great extent must affect the 'length of the period of the return of the fellings to the same loca- 'lity. The greater the area of a forest which can be entirely closed 'to grazing and which can be successfully fire-protected, the more 'rapid may be this return, and within certain limits, dictated by the 'opening out of the canopy, necessary for the exposure of soil and 'the admission of light required to ensure reproduction and to fav- 'our young growth, the more rational can be the treatment."

(3). The late Mr. D'Arcy's notice on the preparation of Working Plans.

"This review of the progress made in the preparation of work- 'ing-plans cannot be more fittingly closed than by noting, in grate- 'ful remembrance, the services rendered in this branch of forest 'administration by the late Mr. D'Arcy, both as Assistant Inspec- 'tor-General of Forests in the ordinary course of his work and by 'the publication of his valuable little book "Notes on the Prepara- 'tion of Working-Plans."

(4). Grazing.

"Grazing, as has been frequently stated, is doubtless the most 'wasteful manner in which a fodder-crop can be reaped, and as 'agriculture advances its importance falls more into the backr 'ground. Moreover, grazing in the forests to be maintained unde- 'tree-growth has the further disadvantage that by it the develop- 'ment of young growth is either destroyed or impeded. The pre- 'sent agricultural development, however, of the greater portion of 'the Indian Empire is not sufficiently advanced to permit anything 'else than a gradual restriction of the previous custom, under 'which the herds, unrestricted as regards numbers or seasons, 'roamed over the whole of the unoccupied areas."

"Lands which, for one or other of the various reasons which 'demand such a course, it is desirable to maintain or place under 'forest growth, doubtless require a different treatment from those 'which can, without prejudice, be utilized *primâ facie* as pasture 'lands; for as regards the former it is imperative that a consider- 'able portion should be closed periodically for a time of sufficient 'length to allow of the establishment of reproduction and its growth 'beyond the reach of danger from cattle; whereas, in the case of

'the latter, it will suffice to close the areas for the period during 'which grass is growing. In either case it is necessary for a 'rational treatment that the number of cattle admitted and the 'period of such admission should be further restricted in proportion 'to the possible fodder-yield of each area.

'In whatever category the waste land belonging to the State 'may be classed in accordance with the policy promulgated by the 'Government of India, it is necessary that endeavours should be 'made, as far as circumstances permit, to ensure eventually its 'systematic treatment. This may, especially as regards areas sub-'ject to grazing, not always be possible in the immediate future. 'Similarity, for example, may be inevitable, at the outset, in 'grazing regulations. But in such a case it is important that the 'regulations should be provisional in character, and capable of 'amendment to suit altered conditions and requirements. Great 'caution should, in particular, be exercised in the grant over 'reserved forests of grazing privileges, either free, or at rates dif-'ferentiated in favour of agricultural cattle or of cattle belonging 'to villages adjoining forests. Besides the injury to revenue result-'ing from the grant of such privileges, administrative embarrass-'ment may be caused when it is considered desirable to withdraw 'them. Difficulty has also been found in distinguishing between 'privileged and other cattle. This difficulty, however, might to a 'great extent be met by demanding in the first instance the same 'fee from all cattle except those of *bonâ fide* right-holders, and by 'refunding the same or part thereof through the revenue adminis-'tration to such persons as the Government may declare to be pri-'vileged."

(5). NATURAL REPRODUCTION AND THE MEANS OF ASSISTING IT.

"It may be accepted that the success or failure of natural re-'production depends, in proportion with the dryness of the climate, 'on successful protection from fire and grazing and from the remo-'val of vegetable mould or of the leaves which form this mould by 'their decomposition. To prevent fires and to prohibit or regulate 'grazing and the removal of mould as far as is compatible with 'other circumstances, is consequently one of the most important 'duties of a forest administration. It is not, however, merely 'forest reproduction that the Indian forester has to secure, but the 'right kind of reproduction; and this is a problem which presents 'frequently the greatest difficulties, and is, under existing circums-'tances, sometimes unattainable. Much can, however, be done in 'directing the course of the process of reproduction into the desired 'lines by felling or girdling round trees of the species it is intended 'to foster with a view to establishing groups of advance-growth of 'the more valuable kinds.

'Such girdling should take place even around younger trees 'of the favoured species, in order to allow of their maturing at an 'earlier age than would otherwise be the case."

(6). Analysis of Financial Results.

The table below contains an analysis of the Revenue and Expenditure :—

			Rs.
Grass Receipts.	(a)	Wood ...	1,11,78,510
	(b)	Minor forest produce ...	15,03,187
	(c)	Grazing ...	17,35,157
	(d)	Revenue from forests not managed by Government, ...	2,63,014
	(e)	Miscellaneous	2,87,267
		Total .	1,49,67,135

					Rs.	Proportion of Expenditure to Gross Receipts Per cent
Expenditure.	A.—Recurring.	(a) Administration.	(i)	Superior staff	17,42,055	11·64
			(ii)	Subordinate staff (including Rangers, Foresters, and Forest Guards)	12,19,874	8·15
			(iii)	Cost of Offices (including contingencies)	5,89,199	3·94
		(b) Working ..	(i)	Cost of extraction	25,97,082	17·35
			(ii)	Roads and Buildings	2,89,308	1 93
			(iii)	Fire protection	2,07,922	1·39
			(iv)	Cultural operations	2,90,198	1·93
			(v)	Live-stock, stores and plant ...	1,99,328	1·33
			(vi)	Working Plans	60,604	·41
			(vii)	Rent of leased forests	1,11,465	·74
			(viii)	Miscellaneous ...	1,30,202	·87
		(c) Expenditure on realization of revenue from forests not managed by Government			8,825	·06
		(d) Forest Science and Education (including all "A" and "B" charges, Forest School) ...			63,173	·33
				Total ...	75,09 226	50 17
	B.—Extraordinary.	(e) Forest Settlements (including compensation)			36,037	·24
		(f) Forest Surveys ...			3,97,762	2·66
		(g) Forest Demarcation ...			1,20,100	·80
				Total ...	5,53,899	3·70
				Grand Total Expenditure ...	80,63,125	53,87
				Net Revenue ...	69,04,010	46·13
						100·00

IV.—REVIEWS.

Reports on the HorticulturalGardens

AT LAHORE, SAHARUNPORE, LUCKNOW, AND IN THE NILGIRIS, FOR 1891-92.

There is not much to be said about the Agri-Horticultural gardens at Lahore. The income was Rs. 13,973 and the expenditure Rs. 22,603, the former chiefly derived from the sale of garden produce, and the latter due to establishment, purchase of plants and seeds, manure and miscellaneous items. The year was unfavourable generally, but grapes, figs and peaches did well. Queensland peaches yield a heavy crop of fruit with excellent flavour. Agricultural experiments yielded nothing of special interest, and the gúr manufactured from acclimatised seed of *Sorghum saccharatum* was not a success.

The report of the gardens at Saharunpore and Mussoorie, under the management of Mr. Gollan is more interesting. A large number of successful experiments in the growing and distribution of various useful and ornamental plants are being made; among fruits, we find the American dewberry, the Arabian date palm, the Avocado pear, Japanese figs, severals kinds of oranges from Florida, two peaches also from Florida one of which is a valuable late kind, plums, persimmon, the star apple, all doing well, whereas there were only a few failures among vines, guava raised from imported seed, and Japanese loquats. Among vegetables, the most important experiment was the introduction of 22 varieties of potatoes from the well-known seedsmen, Sutton and Sons, of Reading. The best kind proved to be Windsor Castle, which yielded very large tubers of excellent quality and quite free from disease. Then in order Early Border, Magnum Bonum, Early Regent, Satisfaction, Masterpiece, and Early Eclipse. In the orders of Government it is said that extracts from the reports should be circulated to potato growers in the hills; many of these men, however, are natives who cannot speak English, and it would be necessary to get these remarks translated into Hindustani for their benefit—this would form a capital exercise for the next examination of the Forest Officers for the Higher Standard, and we offer this suggestion to the authorities for what it is worth.

A new fodder plant, *Lathyrus sylvestris*, did not come up to the expectations formed of it by reading the praise given it, in

European Journals on horticulture. It might do better in a more temperate climate.

The following remarks in sugar cane will be read with interest :—

" Sugarcane (*Saccharum officinarum*).—In the last annual report, ' I noted that a sowing of sugarcane seeds had germinated, but ' sometime after submission of the report in question, I regret to say ' the supposed sugarcane seedlings turned out to belong to various ' species of wild grasses, or, in other words, proved to be weeds. ' The reported success of last season in raising sugarcane from ' seed was therefore in realty a failure. I was led astray by ' seeing the husks of sugarcane seeds adhering to the cotyledons ' or seed leaves of some of the grasses which appeared in the ' seed pans ; but afterwards it was of course found these had ' been merely picked up by the seedling weeds as they emerged from ' the soil. During the past cold season two varieties of sugarcane ' flowered profusely in some parts of the district of Saharunpore. In ' the lands in the immediate vicinity of the city, only a few stray ' flowers were to be met with, but in the northern part of the district ' or close under the Siwalik range of hills nearly every plant flowered ' in some fields. Seed for further experiment has therefore been ' plentiful ; but owing to the mistake of last year, I shall exercise ' more care before passing an opinion. Several sowings of the seeds ' obtained locally have been made since the commencement of March ' in pots in beds made under glass frames, and in beds made in the ' open ground. In all cases an abundant crop of grass seedlings has ' appeared, but so far, I have not with certainty been able to identify ' any of the grasses which have appeared as being the seedling of the ' sugarcane. In addition to the seeds obtained locally, a large ' parcel of Assam sugarcane seed was received from the Director of ' Land Records and Agriculture, North-Western Provinces and ' Oudh, and two small packets, from the Deputy Commissioner of ' Betul. These have been sown under the same conditions of treat- ' ment as given to the local kinds, but the remarks made in the ' preceding paragraph regarding the condition of the latter, also ' apply to the present condition of these Assam and Betul varieties. ' At present, I am of opinion that none of the sugarcane seeds sown ' during the past few months have germinated ; but as I still have a ' considerable quantity of seed on hand, renewed attempts will be ' made to germinate it on the advent of the rains."

Attention was given to arboriculture and the District Board supplied with 1630 trees for avenue purposes, but several thousands moise could have been supplied of necessary. In a climate like that of the Saharanpore district, there is no reason why every road should not have its avenue.

The leaves of Eucalyptus trees were supplied to railways for cleansing the boilers of locomotives, and 103 maunds were thus utilized at a price of Rs. 2 per maund. This appears to be an industry that is capable of extension.

Numerous applications are made every year for trained gardeners, and Mr. Gollan has a class of 24 boys under training for this purpose ; they are sent out on salaries ranging from Rs. 12 to Rs. 25 a month.

The chief function of the Mussoorie garden is to render assistance to the parent institution down below. The main items of interest were the successful cultivation of the giant chestnut of Japan, the tree tomato and Jalap. The tree tomato is well worthy of notice ; it is a plant that is of easy culture, rapid growth, and comes into full bearing at three years from seed. It is perfectly hardy up to 6,000 feet and the fruit begins to ripen about the middle of summer, continues to yield a succession of fruit until midwinter, and can be eaten raw or stewed, with a pleasant sub-acip flavour.

Taking into consideration the value of plants and seeds issued to soldier's gardens and to public gardens in India and other countries either free, or at reduced rates, the Saharanpore gardens are practically self supporting.

At Lucknow, the season, as in other parts of Northern India, was unfavourable for gardening operations, and the high flood of the Goomti in October 1891 submerged the arboretum for over a week, with the result that nearly all the young trees died. Serious loss to fruit trees and cuttings of ornanental shrubs also ensued. Various experiments were tried in these gardens, some of them confirming the results obtained at Saharanpore. The paper mulberry cultivation proved expensive and unprofitable ; the local paper mills gave eight annas a maund for the bark, and intimated that they could not in future take any more. Considerable attention is given at Lucknow to the cultivation of various kind of Eucalyptus, especially *E. citriodora*. Trenching the ground has been found to keep off white ants, but a disease has made its appearance in the bark, several trees losing their leaders from this cause.

The report for the Government gardens and parks, Nilgiris, is written by Mr. Lawson. One of the experimental gardens was visited by a severe storm which destroyed several precious fruit trees but the Durian escaped and for the first time bore fruit. Under the head of economic plants, we notice the attempt to introduce a fluid extract from the blue gum for cleansing boilers, but the reports received concerning it are contradictory. Eucalyptus oil is made on a large scale by a Mr. Wallace and this appears to be of excellent quality. Ipecacuanha is being tried and Jalap produces better in the Nilgiris than the plant grown in Mussoorie. The scrub exterminator, which is now being advertised in the papers, is mentioned as a dangerous poison, highly noxious to cattle grazing in places where it is used.

These gardens and parks are not kept up as a paying concern, and the expenditure largely exceeds the revenue.

A. S.

Indian Gardening.

The appearance of another book on Indian Gardening is an encouraging sign of the times, as indicating an increasing demand for the must recent information regarding the cultivation of English vegetables and flowers in this country. This new book by Mr. Barton West has much to recommend it. It is well arranged, and the illustrations, though many of them savour of the nurseryman's catalogue, cannot fail to make the subject attractive. The book as divided into five parts. Part I, consisting of ten chapters, tells in how to lay out a garden, and is full of sound and practical advice as to the preparation of the soil, the making of lawns and roads, and other necessary operations. In chapter 10 will be found an excellent account of insect pests with directions for their prevention or extermination. Part II takes up the kitchen garden, and gives an alphabetical list, with descriptions, of all the different kinds of vegetables and herbs which may be grown in the plains and on the hills. A similar list of annual and perennial flowering plants finds a place in Part III. Another part is devoted to bulbous plants, and the concluding part gives instructions in cultural operations for every month, for the hills as well as for the plains. This book will be found especially useful for Upper India, but might be consulted with advantage by amateurs in other parts of India with certain adaptations to suit the differences in climate. Two more chapters, the one on Roses and their cultivation, and another on the treatment of fruit trees and Strawberry beds, would have added much to the value of the book.

Practical Gardening for Indian Amateurs, by R. Barton West. Publishers — The Mafasilite Printing Works Company Limited, Mussoorie, 1892. p. p. 379, with numerous illustrations.

Arboriculture in Berar.

The report of the Conservator on arboricultural operations during 1891-92 shews that very little work has been done by District Boards ; there is practically no increase in the number of trees under their care. Each district has its working plan, but more attention should be paid to nurseries—only 2,532 plants were supplied, a very large falling off from the previous year. The P. W. D. however appear to have done better, as they sowed and planted 75 miles of avenue and maintained 59 nurseries at a total cost of Rs. 23,000. We doubt the advisability of sowing in situ for avenue purposes ; it is far more satisfactory to raise the plants in a nursery,—in bamboo baskets is a very good method—and plant in pits with good soil. It is cheaper in the end, and the desired result is obtained sooner. The Commissioner of the H. A. D. promises to look into the matter of arboriculture and we shall hope for greater success next year. The whole question of planting new avenues and maintaining existing ones along roads in India is one of the utmost importance for the country.

V.—SHIKAR.

A New Experience.

The forests we set out to visit in November were remarkable for two reasons, firstly for the prevalence of jungle fever and secondly for the presence of Wild Buffalo. Fact number one did not interest or surprise us, whereas fact number two filled our breasts with much longing and a little hope, and we started armed to the teeth, with quinine for the fever and with a heavy D. B. ·577 express for the buffalo. After days of wandering, during which we were sometimes cheered by the sight of buffalo tracks, sometimes depressed by the paucity of game of any kind, and always regaled by the ready native with wonderful tales of what had happened in years gone by, how the Collector Sahib had fled for his life from a wounded Cow; how the Assistant Engineer had been treed by a furious bull; and how the Opium Wala had been floored by an outraged calf; we arrived somewhat weary and yet full of ardour, on the borders of Nipal and pitched our camp in an open plain dreary enough in itself but rendered beautiful by the magnificent view of the snowy ranges which filled in the northern horizon. We had given up all hopes of buffalo, a chital stag would have satisfied us, we were even keen on the domestic antelope ; so much so that seeing several bucks not far from the tents, we started in the evening to stalk one if possible. The better half of us remained on the pad elephant to watch the sport from a distance and was rejoined later on when a buck had been missed and the calling of chital and the rumbling roar of a leopard recalled us to the possibility of better sport in the neighbouring Sal Forests. The sun was already setting when we entered a narrow grassy glade and stole quietly along amidst the lengthening evening shadows, disturbing, as we went, a couple of hinds and one small stag not fit to shoot. We were tired after a long rough march, prolonged by losing our way and having to walk miles through rough tree jungle ; and the calm coolness of the autumn evening was fully appreciated as we indolently sat on the pad elephant. Suddenly, it seemed as if out of the ground, arose a mighty form which in two lazy bounds reached the edge of the forest and turning, faced us with lowered head and ready horns. And the heavy rifle was miles away in Camp ! The utter futility of attempting to stop that bull with a hollow fronted bullet was our first thought ; the second whether he would charge and scatter us to the winds if we annoyed him ; the third, that if we let pass this chance of bagging a solitary bull

we should never in all our lives have another ! We moved the elephant so as to have something softer than a forehead to aim at but the huge head turning slowly so as to keep a front to the enemy, we steadied the rifle for a second and pressed the trigger ! The smoke rolled slowly down the little glade and as it lifted we saw the buffalo lying dead where he had stood menacingly one instant before. Approaching cautiously, we needlessly expended a couple more cartridges without producing the slightest effect and then surveyed our prize. The first bullet had struck in the centre of the forehead and exploded in the brain. He was a full grown bull in the prime of life ; so far, our knowledge of buffaloes informed us ; but whether exceptionally large we could not tell. At any rate, he was over 11 feet long from the nose to the tip of the tail, and his horns measured 8 feet 4 inches from tip to tip along the outside curve and across the forehead. He was big enough for us, we wanted him no larger ! That night, a noisy procession crossed the level plain under the light of the young moon and through the evening mists. It was preceded by a hurricane lantern, and twenty willing pairs of arms urged the timid oxen to draw the cart heavily laden with the lone monarch of the jungles who fears no foe save man and does not hesitate to make it unpleasant even for him when vexed. Pathos is impossible when one of the last representatives of the virgin forest is lighted to his grave with oil from Batoum and a lantern from America ! But the rifle which had slain him was examined by indigenous experts and pronounced to be hard hitting and when the ever ready sycophant opined that the "sahib's" power was such that one bullet sufficed to kill an elephant, he was silenced by the remark, greeted with much applause, that the bull had died of the shock and surprise of being "Shikared" by the "Mem Sahib."

O. C.

Notes on the Otter.

In these days of fish preservation societies, when much trouble is taken by individuals to improve the sport in certain Indian waters, attention may well be directed to the injury done to the fishing by otters and the means available for diminishing the numbers of these pests. Being a keen fisherman myself, I have, how often, been grieved and infuriated to find, on arrival at well-known pools and reaches, that the fish have been either cleared out altogether or scared away, whilst the numerous tracks on the sandy banks and the remains of many good fish lying about, explained what had been taking place during the previous night. The presence of a few otters on a long stretch of water is bad enough, but when it comes to schools of ten or twelve hunting in line, either the

otters must be removed or fishing must cease. In the *Forst und Jagd Zeitung* for October there are some interesting notes on the difficulties caused in the waters of the Fishing Society on the Neckar at Tübingen. The attempt to introduce new and better varieties of fish into these waters was completely frustrated by the otters, who shewed a marked predilection for new and superior feeding; and the members of the Society were driven to despair until a Godsend, in the shape of a young man with a knowledge of traps, arrived on the scene, who in the course of some six months on some four miles of water, put an end to twelve otters, one badger and a fox. The Fishing Society at Tübingen is now once more happy, having completely circumvented their foes and desire to aid other societies in similar circumstances. It has been calculated that the annual feed of one otter amounts yearly to three-hundred to five hundred pounds of fish, besides what the brute wastes, which would amount to as much more. That this is a moderate estimate, is proved by the fact that a twelve lb. otter caught at Tubingen contained four lbs. of fish; the largest capture, weighing 21 lbs.. would probably have taken six to seven lbs. of fish at a meal! With regard to exterminating otters, shooting has been found to be quite useless; posioning is impossible, as the otter will not touch dead fish; but success attends the laying of spring traps in the run just at the water's edge but not in the water. The Indian otter is more migratory than the European animal but still there are times and places where a stay of some days is made, and it seems to me that it would be quite possible to train a native to skilfully lay traps in the stretch of water in his charge, and that a liberal payment per head would soon result in a considerable diminution of these pests. The trap used by the Tübingen Society is labelled 126 in the Catalogue of Messrs. F. Grell and Company at Heynau, Germany. Form another quarter, in the same periodical, comes a story of the utility of the otter, which must tend to discourage the ardent fisherman. Mr. Oberförster Haug having procured two otter cubs of a few hours old, still with unopened eyes, and wishing to send them to the Stuttgart museum, proceeded to drown the poor wretches and after seven minutes immersion in water, packed them up tightly in newspaper and despatched them by parcel post. He received some days after a letter from the Curator saying that only one had arrived safely, the other having been killed when stamping the parcel; the survivor at once took to a bottle and was thriving vigorously when he wrote!

O. C.

VI.—EXTRACTS, NOTES AND QUERIES.

Parliament House Mimosa, Cape Town.

Mr. D. Hutchins, Conservator of Forests, has made the following report upon the age of the old mimosa tree which was recently blown down in the Parliament House grounds, and to which reference was made at the time in these columns :—

Two transverse sections were sawn off as low down as the decayed state of the trunk would allow, which was about five feet from the ground. Below this were the remains of a large rotten branch that had communicated decay to all below it. The lower part of the trunk was so decayed that the tree must soon have fallen whether the late gale had spared it or not. The mean diameter of the trunk at five feet from the ground was 1 foot 6¼ inches ; there was no regular bole above this. The tree has been cut up so as to afford as much straight wood as possible ; from the branch pieces and out of a piece of the trunk above the first branch, some short planks, one inch thick, have been cut, and are being carefully seasoned.

At first, I thought it would not be possible to arrive at any estimate of the age of the tree from the zones of growth, which are irregular and clearly not annual. This very commonly happens with trees that are natives of mild, equable climates. Very few of the indigenous trees of South Africa show distinct and regular zones of growth, and in the case even of these few we have no certainty that the rings appearing on the transverse section are always annual. This, as is well known, is different from the case of trees that are natives of the northern hemisphere, where the sharply contrasted seasons of summer and winter are clearly traced in the yearly rings of growth. The naturalised oaks and pines have preserved their original habits of growth, and show distinct annual rings here. I was the more disappointed at not finding yearly zones on the Parliament House Mimosa because the *Acacia horrida* is closely allied to the *Acacia arabica* of Asia, about which Sir D. Brandis writes :—

" Pores numerous, uniformly distributed, generally surrounded by a small rounded patch of lighter-coloured tissue, often close together in the inner belt of each annual ring, the outer belt having fewer pores, and appearing on that account of a darker colour."

However, before giving the subject up, I thought I would count the lines of pores, which, over the greater portion of the radius, are quite distinct. A preliminary counting gave 573 lines of pores. This divided by 2 gives 286 years, which is about the historical age of the tree. Mr. Noble was in my office at the time, and I gave him this as a preliminary result.

I was not able till yesterday to take the matter up again. Four different countings, of which two were taken along the same radius, gave the following results, the difficult portions in each radius being more than once verified :

1st	counting (light bad, 6/9/92)	...	... 604
2nd	„ (light good, 14/9/92)	...	... 630
3rd	„ „ 15/9/92)	...	... 626
4th	„ „ „	...	... 615

The second and third of these countings were along the same radius. I consider that the most correct result will be obtained by taking the mean of the last three countings, *i.e.*, 624.

I take it that each line of pores represents the spring and autumn growth.

	Years.
Dividing 624 by 2 we obtain	312
Add 8 years for the growth from seed to 5 feet high ...	8
Total age of tree ...	320

This, I think, is as near a result as can be attained. In some places lignification and incipient decay render the lines of pores indistinct. In any case, this method is far from having the precision that attaches to counting the yearly rings, as it proceeds on the assumption that a line of pores represents the spring and the autumn spurts of growth. Numerous observations, however, in the forests and outside, make it certain that in South Africa, spring and autumn are the two periods of activity in tree growth.

The growth of the Parliament House tree is slowest in the first and last half centuries of its life. Slow periods of growth are observable at the 40, 46, 89, and 260th years. That at eighty-nine would be nine years after the arrival of Van Riebeck and his settlers, and this slow period may be connected with the clearing or draining operations of those days.—(*Cape Times*).

Important tests of Australian woods.

The following important tests of Australian and other woods may be found useful to many of our readers. They were made in the presence of Mr. Thomas Laslett, timber inspector to the Admiralty, and have appeared in the *Shipping World*.

TRANSVERSE EXPERIMENTS.

Name of Wood.	Weight per Cubic Foot.	Specific Gravity.	Transverse Strength per Square Inch.	Average Tensile Experiments.			Vertical or Crushing Strain on Cubes of 2 in.	Number of Years Assigned by English Lloyd's for Shipbuilding Purposes
				Dimensions of Each Piece.	Weight the Piece broke with.	Direct Cohesion on One Square Inch.		
	Lb.		Value of s.	In :	Lb. per sq. in.	Lb. per sq. in	Tons. per sq. in.	Years.
Indian teak ...	49·47	807	2203	2 –2 × 30	13,207	3301	2·838	14
English oak ...	58	886	2117	2—2 × 30	30.287	7571	3·411	9
Jarrah ...	63·12	1000	1800	2--2 × 30	11,760	2940	3·198	12
Karri ...	61·31	981	2264	2 × 2 × 30	28,280	7070	5·140	12

(*Timber Trades Journal.*)

White-ants and Mango Trees.

If the bark of the trees is attacked by white ants, it must be first scraped off at all parts where the animals have made tunnels, and painted with kerosine. Let the ground be dug between the trees as deeply as necessary, the soil turned over and watered with phenyl, if procurable ; if not, with kerosene and water. In Ceylon, a decoction of the leaves of Mauritius hemp is used for expelling white-ants, but I fear, a correspondent writes, you have got into too bad a state for that to be efficacious. It has the advantage of being, of course, quite harmless to any trees. In using the phenyl, put some in a pail and add water till it is of the colour and consistency of good milk. Every plantation should keep phenyl. It is perfectly safe with foliage ; carbolic acid and kerosene are not. It is exceedingly good for mealy bug. Corrosive sublimate and Paris green will both destroy white ants ; dissolve in water and pour into the holes. But be careful not to poison the trees by putting these poisons too close to the roots. Corrosive snblimate is very popular here, being used dry. The planters have told me that one white-ant eats a grain, dies, and is eaten in turn by another who dies and so on till the nest is exterminated. I cannot quite credit this, but the poison has a very strong effect on white-ants. Of course care should be taken in dealing with corrosive sublimate in bulk, as it is an exceedingly dangerous poison. After you have well poisoned the white-ants, remember to manure the

trees well, so that they can have strength to recover. If it is possible to flood the plantation for a few days, the ants would have to retire, but this is rarely possible here at least. I do not think it would hurt the trees, as I have here splendid old trees growing in water. I should like to know the results of these suggestions should you find time to inform me, as I am collecting together all kinds of notes on destructive insects and methods of destruction.—(*Indian Agriculturist.*)

Bulgarian Forestry.

At the National Bulgarian Exhibition at Philippopolis there is a pavilion of forestry, tastefully constructed of logwood, and containing various specimens of woodwork and blocks cut from the stems of the enormous trees which still flourish in the remote primeval woodlands of Rhodope and the Balkans. This is a reminder of the ruthless destruction of Bulgarian forests which went on in Turkish time, and still continues to some extent notwithstanding the efforts of the Bulgarian Government to check it. An interesting feature in this pavilion is a portion of one of the wooden tramways which are used for bringing timber down the steep sides of the mountains. The stems of young trees supply the place of rails; the felled timber is laid on wooden trollies with small wooden wheels, and descends the mountain at a rapid pace in charge of two or three men, who find a precarious standing place on a peg which projects over the wheels, and check the pace by working a brake with the foot.—(*Timber Trades Journal.*)

The teak trade of Chiengmai

The Trade Report for 1891 of this important dependency of Siam, by Mr. Stringer, British Acting Vice-Consul at Chiengmai, should be of considerable interest to the local Government, says the *Rangoon Times*, which has secured an advance copy of it. Much is not known of Chiengmai in Burma, and Moulmein is the only town which has any trade relations with the Laos States, excepting the semi-independent Shan States under British protection, so the report we propose to shortly review here, contains information interesting as well to the general public as to those connected with trade and commerce in Burma. This is the second report of its kind which has been issued, we believe, the first report being for the year 1890.

At present Chiengmai is what may be called a timber country. Its teak is its chief, almost its only, source of wealth, and it is pity to know, as the writer of the report tells us, that the teak forests are being fast ruined by the neglect of the rules of forestry by those

who are working them, with the consequence that teak is becoming scarce in Chiengmai and Lakhon, forests which have for years supplied Bangkok and Moulmein with the high class timber for which the latter port has become famous. We do not understand how there can be such a total absence of conservancy in the forest when the timber trade with Bangkok is chiefly in the hands of British firms, and when the Chiengmai forests on the Salween side are worked almost entirely with British Indian capital brought from Moulmein. One would imagine that intelligent merchants or traders, whether European or Indian, who have such a profitable trade in their hands, would not by neglecting the ordinary rules of forestry and depleting the forests, kill the goose with the golden egg. We could quite understand the Laotians ruining the forests through pure ignorance of forestry. However, the European and Indian Foresters (and the Bombay Burma Trading Corporation is among them) have a great deal of obstacles to content with. Teak saplings, it appears, are cut down in large numbers by the people for use for building purpose and for fences, and although the lessees of the forests are nominally protected against such destructive poaching on their concessions, no steps seem to be taken practically to check it. The forests are leased for only three years, which not only often causes considerable loss to the foresters, but makes them indifferent to the causes which are at work in depleting the forests of teak. It is clear that, unless the foresters strongly represent to the Siamese authorities the necessity of introducing strict forest rules and regulations, and seeing that they are not contravened, the forests will soon become depleted of their teak. We know that it is a very difficult matter for European traders in Oriental countries to influence the local officials even in matters in which the good of the country is involved, but we think that, considering the large gain which it will be to foresters obtaining favourable leases of the Chiengmai forests, the European foresters might, in their own interests, do their best to get the administration of forests placed on a better footing. We have dwelt on this question, because we are of opinion that what benefits Chiengmai is good for Burma in more ways than one. The connection between the dependency of Siam and Burma is one which is cemented and rendered important by the timber trade of Moulmein.

Chiengmai finds an outlet for its timber trade through Bangkok and Moulmein. The average annual quantity of teak which is floated down the Me Ping, Me Wang, and the Me Yom to Bangkok is about the same as reaches Moulmein by the Salwen. However, during the year 1891 the quantity which arrived at Bangkok was abnormally small and far below the quantity which reached Moulmein, although the latter port got 18,244 logs more during the previous year. It is expected that the delivery in the coming season of logs at Bangkok will be much larger, as there will be considerably more water in the rivers than there was during 1891. The timber trade of Bangkok is also chiefly in the hands

of British traders, but as far as we can judge, those connected with the timber trade seem more eager to develop the trade with Bangkok than with Moulmein. During the coming season, it is proposed, as an experiment, to send squared logs instead of logs in the rough, as is being done now, from Chiengmai to Bangkok, as less duty will have to be paid, and the weight to be dragged through the water will be less. Before the logs, intended for delivery at Bangkok, arrive at Chainat, the duty-station on the Menam, they are brought down several branches of the main river, chief of which are the Me Wang, and the Me Yom which we have mentioned. During 1891 these rivers bore 9,500 logs down to the duty-station, against 30,000 the previous year, and upwards of 60,000 during each of the years 1888 and 1889. It is expected that during the coming season, with ordinarily good waters, the delivery from the Me Wang and Me Ping alone will be 30,000 logs, and which high floods 50,000 logs. During 1891, the *Salween* brought 13,873 logs down to Moulmein which was 18,244 logs less than during the previous year. The scarcity of water in the rivers, the result of the scarcity of rice from drought, which appears to have been as acute in Chiengmai as it was in parts of Upper Burma, contributed towards the depression of the teak trade during 1891.

The statistics collected by the British Acting Vice-Consul, considering the informal way in which Siamese officials do things, cannot be expected to be scrupulously correct, but they are correct enough to give one a fair idea of the conditions of this trade. With what facts we have before us, it appears quite certain that if a very material alteration in the forest administration of the forest areas of Chiengmai is not made soon, the teak trade of this province will, in a very few years, be a thing of the past, with the consequent result that Chiengmai will be greatly impoverished and become denuded of many of its inhabitants, who will have to seek occupation in the surrounding districts. The chief source of wealth of the Laos States is their teak, and when the forests become depleted of their teak, the result we have stated must follow.—(*Timber Trades Journal.*)

Podophyllum Emodi.

Mr. D. Hooper, Government Quinologist, Madras, writes to me as follows :—

Since writing to you about the Podophyllum root, a paper has been read on the chemistry of the resin at the British Pharmaceutical Conference at Edinburgh. Mr. Umney, the author, states that he has found less of the supposed active principle—podophyllotoxin —than there is in the root of the American P. PELTATUM. The

paper will appear in full in the Year Book of Pharmacy. Mr. Umney says in conclusion that the Indian drug should be used as an alternative source for the preparation of the official resin in the British Pharmacopœia. I am not satisfied with this result, and am writing to England saying that no conclusion should be drawn until a complete physiological examination has been made of the resin.

INDIAN MUSEUM, CALCUTTA. — EDGAR THURSTON.

VII—TIMBER AND PRODUCE TRADE

The Teak Market.

MESSRS. HOAR & BROWN'S report :—

	Tb. Lds.	Plks. Lds.	Blks. Lds.	Tl. Lds.
Stock, 1st September 1892 ...	5,419	1,391	60	7,905
Landings	nil.	100	23	123
	5,914	2,031	83	8,028
Deliveries	320	121	nil.	441
Stock, 30th September, 1892 ...	5,594	1,910	13	7,587

The deliveries still continue dull, but a few contracts have been entered into for the supply of the Admiralty and other requirements, which will reduce the stock to some considerable extent. Business otherwise remains very quiet, and prices are unaltered. A further shipment from Bangkok has arrived, containing well-manufactured logs and planks, which ought to find a ready market.

MESSRS. DENNY, MOTT, & DICKSON'S report :—Deliveries last month from the docks in London were 465 loads, as against 1,470 loads for the corresponding month of last year.

The nine months ending September 30th show—

	1892.	1891.
Landings in London	5,406	10,858
Deliveries from London	7,497	11,076
Landed stocks in London on 30th September (exclusive of cargoes in course of discharge)	7,587	8,182
Entire floating supply for Europe (including cargoes in course of discharge) ...	19,800	13,400

*Of which fully one-third sold to go into direct consumption.

The above figures show a falling off of 50 per cent. imports and 33 per cent. in the consumption for the last nine months, so far as London is concerned. The imports to Europe for such nine months have been 33,500 loads as against 36,900 loads for the corresponding period of last year. Against this important decrease of 13,400 loads in the supplies, must be set off not only the diminished demand for consumption in the London district, but also perhaps quite as large a proportionate decrease in the consumption in the Clyde, Tyne, and Continent has also greatly fallen off—no doubt partly owing to the heavy increase in the French import duties on timber.

Notwithstanding the dulness of general trade and the hand to mouth character of this year's business, the consumption has exceeded the imports, with the result of reducing the unsold landed stock in Europe to a more moderate level than it has attained for years past ; and this is unquestionably a very sound feature in the market.

The new season's supplies at the Burmah shipping ports are likely to exceed those of last year ; and there will, therefore, doubtless be a tendency to increase next year's shipments to Europe. Shippers, however, complain that present prices are not remunerative, and may reasonably be expected to shrink from the heavy loss which shipments made without regard to actual requirements on this side invariably entail.

The closing three months of the year may (as was the case last year) possibly see a sudden improvement in the shipbuilding trade, which would materially affect prospects for the better ; but prudent shippers will doubtless not commit themselves to heavy charter engagements until the end of the year shall give them a clearer view of the prospects on this side, as well as the new season's supplies to hand at the shipping ports from the Burmese forests. Siam supplies must not be ignored, but the difficulty of selling this Bangkok timber has not decreased, the few small cargoes which have been shipped this year having, as yet, mostly failed to find buyers ; the distrust of this wood, by painful experience, giving it little chance of being imported at a profit—in any case, whilst the present moderate prices continue for the more-trusted Burmah timber.

Churchill and Sim's Circular.

December 7th, 1892.

EAST INDIAN TEAK.—The business for the month has been very similar to that of October, with perhaps a rather more distinct improvement than that then recorded. There is still, however, a want of life in this branch of the trade, which may be expected to last so long as the present depression in the shipping trade continues. The deliveries for the month have been 967 loads, against 1,020 and 882 in the two preceding years, and for the first eleven months 9,401 loads, against 13,341 and 15,382 in 1891 and 1890 respectively.

ROSEWOOD.—East India.—Some small sales have been made, but at rather easier prices.

SATINWOOD.—East India.—*Logs*, if large and figury would realise good prices, but other sorts are dull of sale; *planks* and *boards* are not wanted.

EBONY.—East India is only saleable occasionally and at low prices.

Price Current.

Indian Teak	per load	£9	10s.	to	£15
Satinwood	per ton	£5		to	£10
Rosewood	„	£5		to	£9
Ebony	„	£5		to	£8

MARKET RATES OF PRODUCTS.

(*Tropical Agriculturist, December, 1892.*)

Cardamoms	per lb.	2s.		to	2s. 6d.
Croton seeds	per cwt.	15s.		to	20s.
Cutch	„	20s.		to	32s. —
Gum Arabic, Madras	„	40s.		to	80s.
Gum Kino	„	100s.		to	110s.
India Rubber, Assam	per lb.	1s.	6d.	to	2s. 1½d.
„ Burma	„	1s.	5d.	to	1s. 9d.
Myrabolams, Bombay	per cwt	9s.		to	10s. 6d.
„ Jubbulpore	„	8s.	1½d.	to	9s. 6d.
„ Godavari	„	8s.		to	9s.
Nux Vomica, good	„	8s.		to	9s. 6d.
Orchella, Ceylon	„	22s.		to	28s.
Redwood	per ton	£3		to	£3-10s.
Sandal wood. logs	„	£35		to	£60
„ chips	„	£9		to	£30

VIII.—EXTRACTS FROM OFFICIAL GAZETTES.

1.—Gazette of India.

29th November, 1892.—No. 4760-S. R.—In exercise of the powers conferred by Section 8 of the Indian Stamp Act (I of 1879), the Governor-General in Council is pleased to remit the duties payable on the agreements and security bonds required to be executed, under the Rules to regulate appointments and promotions in the Provincial Forest Service, by students and their sureties previous to entry into the Forest School, Dehra Dun.

9th December, 1892.—No. 1491-F—Erratum.—In the Notification of this Department, No 1328-F., dated the 28th October last *for* the date, 29th December, 1891, entered against the names of Messrs. Hatt, Trafford, and Long, *read* "28th December 1891."

2.—Madras Gazette,

1st December, 1892.—No 553.—Mr. F. A. Lodge, District Forest Officer, Cuddapah, is granted furlough for one year, under articles 340 (*b*) of the Civil Service Regulations, with effect from 7th January 1893.

7th December, 1892.—No. 436.—Under the provisions of section 2 of the Madras Forest Act (V of 1882), the Right Honorable the Governor in Council is pleased to empower M. R. Ry, B. Ramachandra Rao, Deputy Tahsildar and Third class Magistrate of Piler, in the district of Cuddapah, to try forest offences.

14th December 1892.—The two months' leave granted to Ranger Lakshman Rao, and notified at page 1468, Part II of the *Fort St George Gazette,* dated 25th October 1892, is extended up to 8th January 1892.

3.—Bombay Gazette.

28th November, 1892.—Messrs. E. G. Oliver, Deputy Conservator of Forests and R. H. Madan, Extra Assistant Conservator of Forests, respectively delivered over and received charge of the Divisional Forest Office, East Khándesh, on the 15th November 1892, in the afternoon.

12th December 1892.—No. 4911.—Mr. C. Greatheed, Deputy Conservator of Forests, has been allowed by Her Majesty's Secretary of State for India to return to duty within the period of his leave.

No. 5062.—Mr. L. S. Osmaston, Assistant Conservator of Forests, has been allowed by Her Majesty's Secretary of State for India an extension of leave on medical certificate for two months.

4.—BENGAL GAZETTE.

5th December, 1892.—No. 4212.—Consequent on the return of Mr. H. H. Davis, Deputy Conservator of Forests, 1st grade, from the leave granted to him in the Notification, dated 4th June, 1891, the following reversions are ordered in the Upper Controlling Staff of the Bengal Forest Department, with effect from the 3rd November, 1892 :—

Mr. E. G. Chester, Officiating Deputy Conservator of Forests, 1st grade, to revert to Deputy Conservator of Forests, 2nd grade.

Mr. C. G. D. Fordyce, Officiating Deputy Conservator of Forests, 2nd grade, to revert to Deputy Conservator of Forests, 3rd grade.

Mr. G. A. Richardson, Officiating Deputy Conservator of Forests 2nd grade, to revert to Deputy Conservator of Forests, 3rd grade.

5.—N. W. P. & OUDH GAZETTE

13th December, 1892.—No. 5636.—Pandit Sadanand, Forest Ranger, 2nd grade, to be Extra Assistant Conservator of Forests, 4th grade with effect from the 23rd July, 1892.

16th December. 1892.—No. 5696.—Pandit Sada Nand, Extra Assistant Conservator of Forests, is attached to the Jaunsár Forest Division, in the School Circle, with effect from the date of taking charge of his duties.

6.—PUNJAB GAZETTE.

2nd December, 1892.—No. 545.—Messrs. L. Gisborne Smith and J. H. Lace, Deputy Conservators of Forests, respectively made over and received charge of the Direction Division and the duties of Personal Assistant to the Conservator of Forests, Punjab, on the forenoon of the 19th October, 1892, consequent on the latter's return to duty from the privilege leave granted him in *Punjab Government Gazette* Notification No. 725 S., dated 23rd September, 1892.

Mr. Lace holds charge of the Personal Assistantship in addition to his other duties.

9th December, 1892.—No. 564.—His Honor the Lieutenant-Governor of the Punjab is pleased to make the following promotion with effect from the 1st October, 1892 :—

Sádhu Singh, Forest Ranger, to be Extra Assistant Conservator of Forests, 4th Grade.

Note.—When Daulat Rám rejoins he will be ranked above Sadhu Singh.

24th December, 1892.—No. 595.—Mr. G. G. Minniken, Deputy Conservator of Forests, is granted privilege leave for 1 month and 10 days, under Articles 277 and 291 of the Civil Service Regulations, with effect from the 1st January, 1893, or from such subsequent date as he may avail himself of it.

—CENTRAL PROVINCES GAZETTE.

8*th December*, 1892.—No. 4786.—Mr. H. S. K. Edie, Assistant Conservator of Forests, is transferred from Nagpur to the Chhindwara Forest Division.

Mr. Edie relinquished charge of his duties at Nagpur on the afternoon of the 4th November, and assumed charge of the Chhindwara Division from Mr. M. W. Fox-Strangways, I. C. S., Deputy Commissioner, on the forenoon of the 9th ultimo.

15*th December*, 1892.—No. 4870.—With reference to Notification No. 2618, dated the 26th July, 1892, Khan Sahib Munshi Mahomed Ghouse, Extra-Assistant Conservator of Forests, returned from the privilege leave granted to him, and assumed charge of the Raipur Forest Division from Colonel W. S. Brooke, Deputy Commissioner, Raipur, on the forenoon of the 28th ultimo.

No. 4872.—Mr. A. A. Watson, Assistant Conservator of Forests, has been granted, by Her Majesty's Secretary of State for India, three months' leave on medical certificate, in further extension of the leave on medical certificate granted him by Notification No. 2514, dated the 21st July, 1892.

21*st December*, 1892.—The following transfers of Rangers in the Mandla Forest Division are made in the interests of the public service, with effect from the 1st November, 1892 :—

Alli Muttaki, Forest Ranger 1st grade, from the Dindori to the Shaipura Range.

Srideo Bajpai, Forest Ranger 5th grade, from the Shaipura to the Dindori Range.

8.—BURMA GAZETTE.

30*th November*, 1892.—No. 295.—At the departmental examinations held at Rangoon, Monywa, and Mimbu on the 7th November, 1892, the following officers passed the examination in Forest Procedure and Accounts for Forest Officers prescribed in Chapter IV of the Departmental Examination Rules :—

Mr. H. N. Thompson, Assistant Conservator of Forests.
Mr. J. Messer, Assistant Conservator of Forests.
Mr. A. M. Burn Murdoch, Assistant Conservator of Forests.
Mr. H. H. Forteath, Assistant Conservator of Forests.

No. 296.—At the departmental examination held at Rangoon, Monywa, and Mimbu on the 7th November, 1892, the following Forest Officers passed the examination in Law and Revenue for Forest Officers prescribed in Chapter IV of the Departmental Examination Rules :—

Mr. H. N. Thompson, Assistant Conservator of Forests.
Mr. H. H. Forteath, Assistant Conservator of Forests.
Mr. M. Kavanagh, Extra Assistant Conservator of Forests.

26*th November*, 1892.—No. 28 —With reference to Revenue Department Notification No. 393 F., dated the 8th instant, Mr. F. J. Branthwaite, Officiating Deputy Conservator of Forests, made over, and Mr. W. F. L. Tottenham, officiating Deputy Conservator of Forests, received, charge of the Pegu subdivision on the afternoon of the 20th instant.

No. 29.—With reference to Revenue Department Notification No. 393F., dated the 8th instant, Mr. J. Messer, Assistant Conservator of Forests, made over and Mr. F. J. Branthwaite, officiating Deputy Conservator of Forests, received, charge of the Working Plans Division on the forenoon of the 26th instant.

25*th November*, 1892.—No. 11.—With reference to Revenue Department Notification No. 325, dated Rangoon, the 13th October, 1892, Mr. H. H. Forteath, Assistant Conservator of Forests, made over, and Mr. C. W. A. Bruce, Assistant Conservator of Forests, received, charge of the Upper Chindwin division on forenoon of the 16th November, 1892.

30*th November*, 1892.—No. 13.—With reference to Revenne Department Notifications No. 390 and 391 (Forests), dated Rangoon, the 30th November, 1892, Mr. R. C. Dun, Assistant Conservator of Forests, and Mr. W. T. T. McHarg, Officiating Deputy Conservators of Forests, respectively, made over and received charge of the Bhamo Forest division on the afternoon of the 22nd November, 1892.

1*st December*, 1892.—No. 30.—With reference to Revenue Department Notification No. 364, dated the 22nd October, 1892, Mr. G. R. Long, Assistant Conservator of Forests, made over charge of his duties in the Toungoo division on the afternoon of the 5th November, 1892, and assumed charge of the Myanaung subdivision, on the afternoon of the 17th November, 1892.

1892—No.429.—In exercise of the powers conferred by sections 37 and 43 (*a*) of the Burma Forest Act, 1881, the Chief Commissioner adds the following provisos to Rule 8 of the Lower Burma Forest Rules published in Revenue Department Notification No, 327, dated the 14th October 1892, in supersession of provisos 2 and 3 of the said rule. Proviso (2) of this notification will come into force at once. Proviso (3) will come into force from the 1st January 1893 :—

(2) No person shall cut trees within two chains of the banks of any stream or of the outer edge of the berm of any public road to which the Deputy Commissioner of the district in which the stream or road is situated may by public notice declare this rule to apply. The notices published under this rule shall specify the points on the stream or road referred to between which the cutting of trees is prohibited, and shall be served on the headmen of all villages near and posted up at convenient places in such villages and along the banks of the stream or along the road. The Deputy Commissioner may cancel or vary by publication in similar manner any notices issued under this rule.

(3) (i) On all firewood brought to Rangoon, Pegu, Prome, Shwedaung, Paungdè, Yandoon, Henzada, Thayetmyo, Moulmein, Shwegyin, Toungoo, Tavoy, Mergui, and so much of Bassein as lies to the east of the Ngawun river there shall be levied the following fees :—

	Rs.	A.	P.
On firewood not exceeding 6 feet in length and 2 feet in girth, per 1,000 billets	10	0	0
On firewood not exceeding 4 feet 6 inches in length and 2 feet in girth, per 1,000 billets ...	8	0	0
On firewood not exceeding 4 feet 6 inches in length and 1 foot in girth, per 1,000 billets ...	2	8	0
On firewood not exceeding 3 feet in length and 1 foot in girth,, per 1,000 billets...	1	0	0

On firewood, small, in bundles of 10, not exceeding 1 foot in length, per 1,000 bundles ...	1	0	0
On firewood, per log or billet of other dimensions	0	4	0
On firewood, per cart-load	0	4	0

Or at the option of the person paying the fees in the case of firewood brought in split and stacked, the following fees :—

For a stack 6′ × 6′ × 6′	1	4	0
For a stack 6′ × 5′ × 3′	0	8	0

Or, at the option of the person paying the fees, at the rate of Rs- 6 per stack of 1,000 cubic feet.

(ii) The fees prescribed in the foregoing clause shall be levied, in the case of firewood brought into Rangoon, at one or other of the collecting stations at Alôn, Pazundaung, Botataung, William Street wharf or Sinmaleik.

In the case of the remaining towns mentioned in the foregoing clause the fees shall be levied, if the firewood is brought by boat, at one or other of the landing-places mentioned in the second column of the following table, and, if the firewood is brought by land. at any place on the routes mentioned in the third column, which the Chief Commissioner prescribes to be the only routes by which firewood shall be brought by land into the said towns :—

Town.	Landing-places.	Land routes.
Pegu ...	(1) The river-bank near the Forest revenue station.	(1) The Rangoon road.
Prome ...	(2) The river-bank between the water-works and the Forest office.	(1) The Shwedaung road. (2) The old Myedè road. (3) The new Myedè road.
Paungdè —	.....	(1) The Shwedaung road. (2) The Tapun road. (3) The Hmattaing road. (4) The Nattalin road.
Shwedaung ...	(1) The river-bank opposite to the bazaar.	(1) The Prome road. (2) The Paungdè road.
Yandoon ...	(1) The river-bank at Kyundeik (2) The river-bank at Zeseik (3) The river-bank at Yônseik	(1) Firewood to be brought to the landing-places prescribed in column 2.
Henzada —	(1) The river-bank opposite to the bazaar.	(1) The Neikban road.
	(2) The river bank near the Government timber depôt.	(2) The Ingabo road.
Thayetmyo ..	(1) The river bank between the Thana road and the Okpo road.	(1) The Mindôn road. (2) The Mindè road. (3) The Strand road. (4) The Tôndaung road.
Toungoo ...	(1) The Government timber depôt	(1) The Kanyo road. (2) The Kinzeik road.

Town.	Landing-places.	Land route.
Shwegyin ...	(1) The river-bank at Pyinmabinzeik.	(1) The Kywedè road. (2) The Circular road. (3) The Payagyi road.
Moulmein ...	(1) Nantè ... (2) Battery point Government timber depôt. (3) The Mapun chief jetty.	(1) The Amherst road.
Tavoy ...	(1) The Sinzeik Government timber depôt. (2) The depôt below Messrs. Crisp and Co.'s mill.	(1) The Siam road.
Mergui ...	(1) The Nônklè Government timber depôt. (2) The shore above the stone bazaar.	(1) The Kalwi road.
Bassein in the east of the Ngawun	(1) Sinobo ... (2) The Government timber depôt (3) Kyaukngu ..	(1) The Sinobo road. (2) The Tadagyidan road. (3) The Shanywa road.

(iii) No firewood shall be brought into any of the towns referred to in clause (i) until the fees payable in respect thereof as prescribed in clause (i) shall have been paid.

(iv) Notwithstanding the provisions of clauses (i), (ii), and (iii) above, no fees shall be levied on head-loads of firewood brought by women into any of the towns mentioned in clause (i).

(4) (i) A fee at the rate of Rs. 6 per 1,000 cubic feet shall be paid on all firewood, being the produce of land at the disposal of Government, used by steamers, launches, railways, or brickfields in Lower Burma. Such fee shall be paid before the firewood is utilized. Consumers may, subject to the sanction of the Conservator of Forests, take out prepaid licenses in the form of license (Form XV) attached to these rules for the total quantity of firewood to be consumed during any fixed period not exceeding one year or, in the case of firewood intended to be supplied to the Railway, during any period. The fee for prepaid licenses shall be calculated at the rate of Rs. 5 per 1,000 cubic feet of firewood stacked.

(ii) Deputy Commissioners, Deputy Conservators of Forests, subject to the control of the Deputy Commissioner, and any officer specially empowered in this behalf by the Deputy Commissioner, may grant free passes for firewood to be burnt in the manufacture of bricks for pagodas and other religious buildings, or wells and other works of public utility.

FORM XV.—*Prepaid License for Firewood.*

LICENSE to cut, saw, convert, or remove cubic feet of firewood during the period from the to the has been granted under the Lower Burma Forest Rule to on payment of Rs. being at the rate of Rs. 5 per 1,000 cubic feet of firewood stacked, subject to the following conditions :—

(i) that this license is not transferable;

(ii) that this license does not exempt the holder from the payment of duty on firewood brought into Rangoon, Pegu, Prome, Paungdè, Shwedaung, Yandoon, Henzada, Thyetmyo, Toungoo, Shwegyin, Moulmein, Tavoy, Mergui, on that part of Bassein which lies to the east of the Ngawun.

Breach of condition (i) of this license will render the license liable to forfeiture and the holder thereof to the punishment provided in the Forest Rules.

No. 430.—In exercise of the power conferred by section 43 *(f)* of the Lower Burma Forest Act, 1881, the Chief Commissioner makes the following addition to Rule 17 of the rules published in this department Notification No. 11, dated the 10th January 1883. This addition shall come into force from the 1st January 1893:—

All firewood in respect of which there is reason to believe that any money is payable to Government may be stopped and examined by a Forest Officer anywhere at a landing-place or on a land route prescribed under Rule 8, proviso (3) (ii).

No. 431.—In exercise of the power conferred by sections 37 and 43 (*a*) of the Burma Forest Act, 1881, the Chief Commissioner makes the following rules for the Arakan division concerning the levy of a duty on firewood and the protection of shade trees on the banks of streams and sides of roads. These rules shall be read with the rules published in Revenue Department Notification No. 12, dated the 10th January 1883, and shall come into force from the 1st January 1893:—

8. (i) On all firewood brought to Akyab there shall be levied the following fees:—

	Rs.	A.	A.
On firewood not exceeding 6 feet in length and 2 feet in girth, per 1,000 billets	10	0	0
On firewood not exceeding 4 feet 6 inches in length and 2 feet in girth, per 1,000 billets	8	0	0
On firewood not exceeding 4 feet 6 inches in length and 1 foot in girth, per 1,000 billets ...	2	8	0
On firewood not exceeding 3 feet in length and 1 foot in girth, per 1,000 billets	1	0	0
On firewood, small, in bundles of 10, not exceeding 1 foot in length, per 1 000 bundles ...	1	0	0

Or, at the option of the person paying the fees in the case of firewood brought in split and stacked, the following fees:—

	Rs.	A.	P.
For a stack 6′ × 6′ × 6′	1	4	0
For a stack 6′ × 5′ × 3′	0	8	0

Or, at the option of the person paying the fees, at the rate of Rs. 6 per stack of 1,000 cubic feet.

(ii) The fees prescribed in the foregoing clause shall be paid at one or other of the following landing-places:—

(1) The bank of the Satyogya creek between Kathiywa stream and Piligaung road.

(2) The bank of the Kaladan river from Paikseik or Jhallia creek to Monastery road.

(iii) No firewood shall be removed from any of the places referred to in clause (ii) until the fees payable in respect thereof as prescribed in clause (i) shall have been paid.

(iv) Notwithstanding the provisions of clauses (i), (ii) and (iii) above, no fees shall be levied on head-loads of firewood brought by women into Akyab.

9. A fee at the rate of Rs. 6 per 1,000 cubic feet shall be paid on all firewood, being the produce of land at the disposal of Government, used by steamers, launches, railways, or brickfields in the Arakan division. Such fee shall be paid before the firewood is utilized. Consumers may, subject to the sanction of the Commissioner, take out prepaid licenses in the form of License Form III attached to these rules for the total quantity of firewood to be consumed during any fixed period not exceeding one year. The fee for prepaid licenses shall be calculated at the rate of Rs. 5 per 1,000 cubic feet of firewood stacked.

10. Depnty Commissioners, and any officer specially empowered in this behalf by the Deputy Commissioner, may grant free passes for firewood to be burnt in the manufacture of bricks for pagodas and other religious buildings, or wells and other works of public utility.

11. No person shall cut trees within two chains of the banks of any stream or of the outer edge of the berm of any public road to which the Deputy Commissioner of the district in which the stream or road is situated may by public notice declare this rule to apply. The notices published under this rule shall specify the points on the stream or road referred to between which the cutting of trees is prohibited, and shall be served on the headmen of all villages near and posted up at conspicuous places in such villages and along the banks of the stream or along the road. The Deputy Commissioner may cancel or vary by publication in similar manner any notices issued under this rule.

10. Any person infringing Rule 8 or Rule 9 or Rule 11 shall be punishable with imprisonment for a term which may extend to six months, or with fine which may extend to Rs. 500, or with both."

FORM III.—*Prepaid License for Firewood.*

LICENSE to cut, saw, convert, or remove cubic feet of firewood during the period from the to the has been granted under the Arakan Forest Rules to on payment of Rs. being at the rate of Rs. 5 per 1,000 cubic feet of firewood stacked, subject to the following conditions :—

(i) that this license is not transferable ;

(ii) that this license does not exempt the holder from the payment of duty on firewood brought into Akyab.

Breach of condition (i) of this license will render the license liable to forfeiture and the holder thereof to the punishment provided in Rule 10 of the Arakan Forest Rules.

7th December, 1892.—No. 436.—The following transfers are ordered in the Forest Department :—

Mr. H. N. Thompson, Assistant Conservator of Forests, from Monywa to the charge of the Mingin sub-division of the Lower Chindwin division.

Mr. H. H. Forteath, Assistant Conservator of Forests, from Kindat to the charge of the Paungbyin sub-division of the Upper Chindwin division.

8th December, 1892.—No. 437.—Mr. R. F. Lowis, Extra Assistant Conservator of Forests, is transferred from the Pyinmana Forest division to the charge of the Ruby Mines sub-division of the Katha Forest division.

No. 439.—Under the provisions of section 4, sub-section (2), of the Upper Burma Forest Regulation, 1887, the Chief Commissioner appoints the Forest Officer in charge of the Bhamo Forest division to be the Forest Officer to assist the Forest Settlement Officer in the enquiry ordered in this department Notification No. 168, dated the 2nd October, 1890.

No. 300.—At the departmental examinations held at Bassein, Theyetmyo, Moulmein, Tavoy, Shwegyin, Toungoo, Mandalay, Bhamo, Katha, Môgok, Monywa, Ye-u, Minbu, Myingyan, Yamethin, Lashio, and Taunggyi (Southern Shan States) on the 7th and 8th November, 1892, the following officers passed in Burmese by the standards specified :—

Higher Standard.

Mr. H. N. Thompson, Assistant Conservator of Forests.
Mr. H. H. Forteath, Assistant Conservator of Forests.

Lower Standard.

Mr. A. M. Burn-Murdoch, Assistant Conservator of Forests,—*with credit.*
Mr. M. Kavanagh, Extra Assistant Conservator of Forests,—*with credit.*

9th December, 1892.—No. 14.—With reference to Revenue Department Notifications Nos. 362 and 363 (Forests), dated the 19th October, 1892, Mr. D. L Richardson, Myook, reported his arrival at Katha for forest settlement duty on the forenoon of the 24th November, 1892.

No. 15,—With reference to Revenue Department Notification No. 391, (Forests), dated the 3rd November, 1892, Mr. R. C. Dun, Assistant Conservator of Forests, reported his arrival in Katha on the forenoon of the 29th November, 1892.

13th December, 1892.—No. 451.—Under the provisions of Article 291 of the Civil Service Regulations, Mr. C. Ingram, Extra Assistant Conservator of Forests, is granted privilege leave for three months with effect from the date on which he may avail himself of it.

No. 452.—Under the provisions of Article 340 *(b)* of the Civil Service Regulations, furlough for four days is granted to Mr. H. Slade, Deputy Conservator of Forests, in extension of the furlough for 15 months granted to him in Revenue Department Notification No. 53 (Forests), dated the 12th March, 1891, and the extension thereof for three months granted to him by the Secretary of State for India.

15th December, 1892.—No. 307 —At the departmental examination held at Moulmein on the 7th November, 1892, the following officer passed the examination in Forest Procedure and Accounts for Forest Officers prescribed in Chapter IV of the Departmental Examination Rules :—

Mr. P. W. Healy, Extra Assistant Conservator of Forests.

20th December, 1892.—No. 460.—Mr. G. R. Long, Assistant Conservator of Forests, is transferred from Myanaung to the charge of the South Tenasserim Forest Division.

21st December, 1892.—No. 461.—The following alteration of rank is ordered in the Forest Department :—

With effect from the 2nd August 1892, consequent on the return of Mr. H. B. Ward from privilege leave :

Mr. C. H. Hobart-Hampden, Deputy Conservator, 4th (officiating 2nd) grade, to officiate as Deputy Conservator, 3rd grade.

No. 462.—The following temporary promotion is ordered in the Forest Department, with effect from the 7th November, 1892 :—

Mr. J. Messer, Assistant Conservator of Forests, 2nd grade, to officiate as Assistant Conservator, 1st grade.

22nd December, 1892.—No. 463.—The Chief Commissioner appoints Lieutenant H N. Warde, Assistant Commissioner, to succeed the Subdivisional Officer, Yawdwin, as Forest Settlement Officer for the purpose of the enquiry ordered in this department Notification No. 244 dated the 19th August, 1892.

No. 464.—Mr. J M. T George, Assistant Commissioner, is appointed to be a Settlement officer in the Sagaing district.

20th December, 1892.—No. 16.—Mr W A. Hearsey, Extra Assistant Conservator of Forests, reported this return from the privilege leave granted to him in Revenue Department Notification No. 215, Forests, of the 29th September 1892, on the forenoon of the 1st December 1892.

10.—HYDERABAD RESIDENCY GAZETTE.

23rd November, 1892.—No. 354.—The Resident is pleased to invest the below mentioned Forest Officers in Berar with the powers described in section 36 *(a)*, *(b)*, *(c)*, *(d)*, *(f)*, *(g)*, and *(h)*, of the Berar Forest Law, 1886 :—

Mr. G. F Prevost, Deputy Conservator of Forests.
Mr. E. M. Coventry, Assistant Conservator of Forests.
Mr. Mansukh Rai, Extra Assistant Conservator of Forests.
Mr. C. Haldane, Extra Assistant Conservator of Forests.

11.—MYSORE GAZETTE.

16th December, 1192.—No. 8627. Mr. B Srinivasa Rao, Sub-Assistant Conservator of Forests, reported himself for duty in the Kolar District on the forenoon of the 15th November, 1892.

8th December, *1892*.—No. 8043—G. 1956-92.—Mr. S. A. Bapu Rao assumed charge of the Office of the Assistant Conservator of Forests, Bangalore, on the 11th August 1892.

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